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SHOCK, FLUIDS, AND ELECTROLYTES, 1905-1955

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THE SUBJECTS under discussion do not belong exclusively to the province of surgery, but since the turn of the century they have increasingly occupied the attention of surgeons and greatly extended their efforts. It would be impossible to review the enormous literature in these fields comprehensively, comprising as it does the contributions of clinicians, physiologists, biochemists, and an assortment of other specialists. It is worthwhile, on the other hand, to examine the changing concepts of 50 years, to pick out certain of the high points in development, to evaluate the usefulness and validity of our current knowledge, to chart the current directions of activity, and to speculate a little as to what can be expected in the future. It is interesting to note that of the three topics in the title of this paper, only shock appeared in the cumulative index of SURGERY, GYNECOLOGY AND OBSTETRICS of 30 years ago.

SHOCK

Nineteen hundred and five is an appropriate year to begin; the following year Crile (14) published his first report on blood transfusion, and only shortly before reports on blood grouping had signaled a great revival of interest in this vital field (47, 41). Shock at this time was an even more nebulous term than it is now, being ascribed to a wide variety of clinical states of which the common denominator was mainly prostration. The inability to separate factors such as infection, anesthesia, blood loss, dehydration, heart failure, and hormonal changes greatly hampered any successful unraveling of this complex picture, and tended to invoke the use of rather abstruse terms like "exhaustion" and "toxicity" to explain it. Few methods were available for its study, and fewer still for its treatment. Halstead had re-emphasized the need for careful surgical technique, yet patients with minimal operative trauma developed shock. Crile, working with a great deal of hyperthyroidism in the pre-iodine days, noted that the patients were likely to develop prostration during crisis, and felt very strongly that overactivity of the central nervous system exhausted the patient. He believed that this could be obviated by preventing noxious stimuli from leaving the operative site with local anesthesia, a process to which he gave the name anoci-association (15). He went on to study the effects of stress on the nervous system under a variety of experimental conditions. The approach did not prove a fruitful one; nevertheless, in one form or another, interest in reflex responses has consistently recurred to this day. The question of toxins was raised most coherently by Dale and

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Laidlaw (18), in relating the pharmacologic action of histamine in the production of cardiovascular collapse to the state produced by the adminstration of peptones; they proposed that protein breakdown products which followed injury might account for profound changes in circulatory dynamics. Dale's great work with pressor amines led to their clinical use for the support of the blood pressure in the shock state, again a solution with rather narrow limitations. Circulating vasodepressor substances have by no means been laid to rest; they still represent one of the most challenging aspects of this field.

Indeed, interest in toxins flourished vigorously as a result of investigations undertaken during the first World War. This, and the subsequent holocaust a quarter of a century later brought the shock problem sharply into focus by virtue of the concentration of wounded men in numbers not encountered in civilian practice. Early in the war the British government established a committee for the specific purpose of studying shock; Bayliss, a moving figure in this effort, was joined by Cannon from the United States. The joint researches of these men, and those of Cannon separately, were particularly concerned with crushing trauma and with ischemic injury (3, 9, 10). The fact that tourniquets above a limb so traumatized would forestall the onset of shock until their release seemed inescapable evidence of the presence of toxins and their predominant role in the shock state. Cannon was able to demonstrate this even more convincingly in cross transfusion experiments. Hemoconcentration with a diminution of blood volume was clearly recognized; Dale (17), indeed, used vital red as an indicator years before T-1824 (43), concluding that "a considerable part of the blood passes out of currency," that since it was not in the arteries and veins, it must be in the capillary areas, and that the "diffuse, dusky congestion" of the bowel accounted for a good deal of it. Very similar studies were conducted on this side of the Atlantic by Erlanger and his associates (22). The cause of the hypovolemia was not apparent, however, especially in the type of crush injury to the extremity that was so widely studied (in great part because it obviated infection), and Cannon concludes in 1922 (9) regarding the various theories other than toxemia then proposed, "Their chief and common defect is that they fail to account for the occurrence, both in clinical and experimental shock, of a diminution in blood volume . . . . what is required is a demonstration of some factor . . . . which may so operate that, when hemorrhage and infection are ruled out, the persistent low blood pressure characteristic of shock will become gradually established."

That confusion was prevalent is evident in the report of the Fourth Interallied Surgical Congress regarding blood transfusion (61). It states "Blood transfusion actually gives results which suffice for its adoption as the method of choice in the treatment of severe hemorrhages. . . . In shock the indications for transfusion are not sufficiently definite." Bowlby (6), writing 35 years ago in SURGERY, GYNECOLOGY and OBSTETRICS on the care of war wounded, concludes that toxemias of various kinds may produce circulatory phenomena which characterize shock, that great blood loss causes "conditions and symptoms closely allied with those of shock;" he makes the highly contemporary statement, "the practical deduction which is to be drawn from the consideration of our present knowledge of shock is that, inasmuch as the principal phenomena are loss of blood volume and fall of blood pressure, the obvious aim should be to restore these;" he then states his conviction that both pressure and volume are better sustained by fluid given by the gastric or rectal route than by the same quantity given intravenously, except in the severest cases, for which he recommends the use of Bayliss's 6 per cent gum acacia, the first plasma expander. "In proportion, as the shock condition is due to excessive bleeding, the infusion of blood is better than gum, and is undoubtedly indicated; *not less than a pint should be given.*"

The foregoing writer is selected as typifying the prevailing attitudes among medical officers in the field, and points up some of the difficulties in evaluating clinical material. (The distinction between wound shock and hemorrhage shock is a perfectly practical one and was, in fact, reintroduced in a somewhat different connection during the last war.) The two greatest stumbling blocks were the prevalence of established infection and septicemia, which could not successfully be dealt with for several more decades, and the difficulty in administering blood. The British did not use blood until stimulated by the American Medical Corps, and its use was at best a tedious undertaking. Lewisohn (49) had introduced citrate in 1915; prior to this, and indeed for some time afterward, most transfusions were given by the direct method, which limited their applica-

tion mainly to elective situations such as anemia and also limited the total amount of blood given. The reaction rate commonly ran as high as 50 per cent (56). It was feasible to bring a donor or two to the operating room when the need could be anticipated, but next to impossible to obtain large quantities of compatible blood on short notice; under these circumstances it is little wonder that the value of blood was hard to assess. An early report had suggested the possibility of cold storage of blood (citrated, for autotransfusion) (32). During the period between the wars the greatest advances in the therapy of shock developed along the lines of facilitating the transfusion of blood. Refinements were made in crossmatching, which minimized the dangers of incompatible transfusion. Alsever and others improved the anticoagulant media, allowing storage for practical intervals. The concept of the blood bank became a reality. Experimental work, meanwhile, strongly supported the importance of blood volume replacement. In 1927 Blalock (5) published the first of a series of articles studying circulatory dynamics during shock, in which it was shown that hypovolemia of trauma could be almost entirely accounted for by transudation and hemorrhage into the traumatized area, that the diminished blood volume could in itself produce the shock state, and that restoration and maintenance of the blood volume was in many instances satisfactory treatment. This elegant demonstration was widely accepted, and strong corroboratory evidence was obtained by workers in the study of burns, showing again the local loss of fluid from the blood stream into the area of injury, and the efficacy of replacement. The common denominator of hypovolemia in shock appeared to reconcile the diverse findings at autopsy in dogs dying of traumatic shock and of hemorrhage—the former showing great capillary engorgement and the latter, pale, exsanguinated tissues. Although Moon steadfastly held such differences to indicate the action of toxins (2), most observers interpreted them to indicate merely the loss of plasma volume as opposed to whole blood and felt that the final effect on circulatory dynamics was roughly equivalent. Gregerson and Gibson's development of a workable method for the estimation of plasma volume and red cell mass placed a valuable tool in the hands of clinicians (31), and data began to accumulate on the degree of hypovolemia in burns (34), surgical procedures (29), and various other conditions. It was also shown that many patients with chronic diseases came to operation with a blood volume already dangerously lowered and that they were much more susceptible to surgical shock than those in the normal state.

Thus, at the start of World War II hypovolemia was the dominating consideration in the concept of shock. It was well recognized, as Bayliss had shown years before, that electrolyte solutions diffuse from the blood stream too rapidly to be of much therapeutic value and that colloidal solutions would be necessary. The National Research Council authorized the vast Red Cross program of plasma collection and lyophilization, and supported programs for the study of other colloidal solutions, particularly gelatin. The Germans meanwhile developed the synthetic colloid polyvinylpyrrolidone (38, 65). Much of the experimental work on shock and the evaluation of therapeutic measures employed hemorrhage as the shocking mechanism, a simple and reproducible technique and one which minimized the differences between blood, plasma, and other colloidal solutions. It seemed reasonable that other forms of injury which were known to lead to hemoconcentration would be even more suitable for treatment with solutions containing no red cells (55). Reconstituted dried plasma proved of great efficacy and undoubtedly saved many lives. During the North African campaign, however, very real discrepancies began to appear. Churchill, the Theater Consultant, noted a striking difference in casualty response when blood was available and reintroduced the concept of wound shock as opposed to simple hemorrhage to emphasize the fact that in the presence of an injury which would exert its effects over a considerable period and require surgical care and anesthesia, blood was a clearly superior agent. The term "blood substitute" was gradually dropped and replaced by "plasma expander," and substances other than blood were more and more regarded as stopgap materials, for use until blood was accessible. Nevertheless, the plasma and synthetic program remained a vital one; logistic factors largely restricted the use of blood to fixed installations, whereas plasma was readily available at the lowest echelon.

Plasma, however, had the discouraging property of giving rise to homologous serum jaundice in a significant percentage of cases. With the first thermonuclear explosion at Hiroshima, the prospect of casualty treatment on a larger scale than

ever before envisioned became frighteningly evident, and lent urgent impetus to the stockpiling of disaster equipment. Efforts to free plasma of the hepatitis virus have not come to complete fruition. Of the various chemical and physical means, Allen's suggestion of simply storing the plasma at room temperature is the most promising at present (2). The great work of Cohn in blood fractionation has produced a number of natural protein solutions with suitable osmotic properties which are nonicterogenic. Nonetheless, plasma is costly and difficult to supply in peacetime on a voluntary basis, so that there is still a distinct place for the volume expanders. Even more pressing is the need for methods of whole blood preservation which will simplify the logistics problem and permit the stockpiling of erythrocytes. During the Korean conflict, especially in the latter phases, the unusually stable conditions and limited front allowed the emergency use of blood on an unprecedented scale and plainly established its indispensable character. The recent reports on the quick freezing of erythrocytes in glycerol solution afford the hope that this method or a similar one can be applied on a production basis.

Although hypovolemia, or a disproportion between circulating volume and the capacity of the vascular system, is accepted as the most significant factor in the shock picture, and volume replacement is entrenched as the major therapeutic weapon, it would be a great over-simplification to abandon the problem here. The concept of "irreversible shock" has now come to mean "that shock which cannot be cured by transfusion;" this definite state has stimulated much of the most important recent work. The principal feature of "irreversibility" is that it is a function of duration; Cannon's idea of something operating so that when . . . . "hemorrhage has been ruled out, the persistent low blood pressure will be maintained" has been vindicated, although this something would appear not to be related so much to the trauma itself but to the circulatory responses and the resulting anoxia. Shorr's discovery of circulatory vasodepressor material, which he identifies with ferratin, and his observation that the anoxic liver progressively loses the ability to inactivate such material are extremely interesting (68). Fine and his collaborators also implicate the anoxic liver as the site of failure when the shock state has developed to the irreversible point and show that provision of an exogenous arterial blood supply to the liver protects the animal, but they conclude that the proliferation of anaerobic organisms and their toxins are responsible (26). How these findings can be employed clinically is not at present obvious. A number of other questions also need answers; for example, what is the role that vasoconstricting agents, such as norepinephrine, might be expected to play therapeutically? Sympathomimetic agents fell into disrepute during the emergence of infusion therapy, but when one examines data such as those of Howard on Korean casualties, when blood volume was replaced four or five times in subjects whose blood loss seemed by no means commensurate, one cannot help wondering whether pressor agents might not effectively redistribute the contents of the vascular tree to provide more effective circulation. In this connection, however, the findings of Freeman 20 years ago are pertinent; he produced shock by the continuous infusion of epinephrine and postulated that arteriolar constriction eventually led to capillary anoxia, increased permeability, and plasma leak (27). Certain other investigations suggest that the activity of the sympathetic nervous system may have undesirable effects. The efficacy of Laborit's lytic cocktail (45), a major component of which is an autonomic blocking agent, is unsubstantiated. Nevertheless, provided that the blood volume is normal, hypotensive anesthesia has not proved detrimental, and hypothermia has unquestionable protective value in anoxic conditions; both these procedures may also involve sympatholytic drugs.

Again, the place for intra-arterial transfusion has not been settled. This technique was originally proposed as a life-saving measure when intravenous administration had failed (44), and was subsequently supported by many clinical reports. The weight of almost all of the experimental evidence is to the effect that blood given by the intra-arterial route is no more effective than that given intravenously (11, 60), if the rate and volume are equivalent. In spite of this, the feeling persists that intra-arterial transfusion may benefit an occasional desperately injured patient, and there is room for discussion.

One additional aspect which has not received much attention is the role of the adrenal cortex in the acute phase of shock. Swingle showed many years ago that adrenal ablation led to shock (72); this was subsequently found to be due largely to salt depletion. The successful use

of this operation for hypertension, however, indicates that not all the factors are understood. There are relatively few data available on cortical activity during hypotension or on adrenal blood flow; much of the data comes from burn studies and indicates some degree of increased function (23). Whether this be optimal or not is an entirely open question. Certainly in the earlier burn work, cortical substances without adequate volume replacement were not helpful. Whether they have a role to play as an adjunct will be learned in the future.

FLUIDS AND ELECTROLYTES

Fluid and electrolyte therapy did not enter a dynamic phase until the early 1920's. Prior to this time, of course, water had been an important therapeutic agent, commonly administered by rectum via the Murphy drip; dehydration was recognized as a detrimental condition and clinicians were well aware that diuresis in the postoperative patient often signalled a turn for the better and a propitious outcome. Crile (15), writing editorially in SURGERY, GYNECOLOGY and OBSTETRICS in 1922 says, "In acute surgery, water is perhaps our most potent therapeutic agent. . . . It follows that the patient should have water at every stage of his progress . . . . by each and every route that will assure its reaching the cells . . . day after day until recovery or death. *Water early, water continuously, water late,*—fresh water always. . . ." In the same year, an editorial on intestinal obstruction fails to mention the use of fluids during the acute phase. The stage had been set, however, by Van Slyke in 1917 with preliminary work on the bicarbonate concentration of plasma and its relation to acid base changes, and over the next 6 years the *Journal of Biochemistry* carried a number of Van Slyke's reports: methods for determining bicarbonates (74), chlorides (75), and a discussion of acid base balance. With these methods at hand, numerous observations on the serum levels in various conditions began to appear. For instance, acidosis was found in shock, due to anaerobic metabolism in the face of low renal output, and led to a false start in the direction of the treatment of shock with insulin and glucose (25). On the other hand, low chloride levels turned up consistently in patients with intestinal obstruction; this finding provided an immediately applicable therapeutic approach. In 1923 Haden and Orr (33) studied the problem of jejunal obstruction experimentally, finding that "very quickly after the obstruction is made, the chlorides of the blood begin to fall with a coincident rise in the carbon dioxide combining power of the plasma," and that the daily administration of physiologic saline solution would greatly increase the survival time of this preparation and forestall the rise in nonprotein nitrogen which heralded "toxemia." Walters and Bollman (77) came to an exactly similar conclusion in regard to gastric fistulas; so did Hartman and Rountree (7) in regard to duodenal fistula. Other studies also pointed to the seriousness of chloride loss, such as Moss's work on miner's cramp (58), and the elucidation of the convulsions of "water intoxication" as being due to alkalosis and salt depletion (70).

Three years after Crile's statement, Walters (76) wrote, "It has been possible to control the toxemia accompanying acute duodenal and gastric fistula by the intravenous injection of isotonic sodium chloride solution. Fluid balance seems to play an important part, for these injections in concentrated solution, even in sufficient amount to raise the blood chloride to normal have practically no effect. . . . If, however, a sufficient volume of water is added to the salt, life may be maintained three weeks or longer, during which time . . . . non-protein nitrogen is prevented from accumulating in the blood"; and W. J. Mayo (54) wrote, "Now that we have, by means of examination of the blood, developed methods of precision for determining metabolic changes, many patients apparently moribund can be lifted out of the pit, so to speak, and enabled to undergo a life saving operation that would have been otherwise impossible."

Simultaneously, advances in the direction of the mechanical aspects of intravenous therapy were being made which would prove of great advantage. Thalheimer described an early apparatus (73), and Matas followed with some modifications and a strong plea for the use of continuous infusion (53). Pyrexia attended many such infusions, sometimes to an alarming degree; the work of Seibert who identified protein bacterial products in the distillate of city water (66) led to more elaborate distillation, which eliminated many reactions. As these kinks were worked out, the intravenous route proved to be markedly superior as to surety of absorption and flexibility of volume, rate, and type of solution.

Many interesting observations were made on cases of intestinal obstruction. It was found that

the drop in chlorides correlated well with mortality, but was not necessarily related to vomiting (63). Several writers, including MacFee (52) and Gatch (30), comment on the similarity of the clinical picture with that of traumatic shock, and speculate on toxemias and "duodenal intoxication." The fact that large quantities of salt (90 gm.) could be infused with virtually no chlorides appearing in the urine was an early clue to the action of cortical hormones, but was generally misinterpreted to mean failure of repletion of the salt deficit. Wangensteen published a classic series of articles showing clearly the diminution of blood volume due to shift of fluid into the intestine, and the inability of the kidney to regulate homeostasis in the face of sharp curtailment of the renal blood flow; the toxemia of obstruction was demolished (only to reappear later, as had been the case with shock) and saline solution had come into its own. In the early thirties physiologic saline solution was used widely, indiscriminately, and often exclusively, for hydration.

During this period, however, great strides were made in the physiology of fluid balance and electrolyte metabolism. Estimates of the insensible loss of water as vapor and sweat were made (79) to form a basis for computing the total water requirement. The various fluid compartments were outlined: a method was reported for measuring extracellular fluid (13); the dye method for plasma volume was refined; Hevesy began using deuterium oxide distribution to get values for total body water (39). Landis elaborated on the relationship of intravascular and interstitial fluid via the capillary (46). It became apparent that the interstitial compartment was capable of wide variations, serving somewhat as a buffer for changes in the blood volume, and that all three compartments were affected by changes occurring in any one of them. Similar data were obtained for electrolytes. Gamble analyzed carefully the concentration of the common ions in plasma and in muscle, both in states of normal and abnormal hydration (28). Toward the end of the decade, radioisotopes became available and began to afford additional information on turnover rates and distribution (42); the development of the flame photometer revolutionized the determination of cations, transforming this from a burdensome specialized technique to an easily performed clinical method.

Richards' fundamental researches into kidney function were summarized in the Harvey Lectures of 1934 (62), presaging the work of Homer Smith (69) and, later, Pitts (59), in the course of which the mechanisms of diuresis, renal conservation of water and salt, and tubular reabsorption of fixed base with substitution of ammonia or hydrogen ion to regulate the hydrogen ions in the blood were greatly illuminated.

During this period, also, the adrenocortical substances came increasingly into prominence; Loeb showed the striking effect of the adrenal glands on the renal retention of salt (51), and Harrop studied fluid shifts and renal excretion of water under their influence (35). The metabolic changes following the administration of adrenal hormone, and those of trauma (71) proved to have remarkable similarities. Fluid and salt were retained, renal output was low, there was a loss of potassium and nitrogen, and interference with glucose metabolism. These findings culminated in Selye's concept of the stress syndrome, an expression of adrenocortical activity in response to a wide variety of pathologic states (67). Confirmation of cortical hyperfunction in operative or traumatized patients has been obtained by a number of investigators (48).

Thus, by the end of the thirties, fluid and salt administration had been put on a rational basis. Basic fluid requirements were set at somewhere between 2,000 and 3,000 c.c., but salt was administered far more sparingly, especially during the first few postoperative days when it was given merely to cover gastrointestinal drainage loss. (Lockwood and associates (50) subsequently measured the ionic content of various gastric intestinal secretions). By 1937 Coller and Maddock stated the principles of water and saline therapy in the surgical patient essentially in their current form (12).

In 1946 Darrow (19) published a study of the electrolyte balance in infants recovering from severe diarrhea. He noted a striking potassium retention during the recovery phase, postulated a deficiency of this ion as being responsible for mortality in many instances, and recommended its use in therapy. Almost simultaneously, Holler (40) reported low potassium levels in a patient under treatment for diabetic acidosis, in whom potassium administration had evidently been life-saving. These two observations opened a new and fruitful field in electrolyte therapy, of which surgeons were alert to take advantage.

Potassium had long been known as the predominant intracellular cation, and its essential

catalytic properties in a number of enzymatic reactions, particularly those of the glocolytic series, were well recognized (24).

Using radiopotassium, the "exchangeable" potassium, i.e., that which comes into equilibrium with administered potassium, proves to be about 98 per cent intracellular (12). It can readily be seen that serum potassium levels do not necessarily reflect potassium deficits, as the serum potassium can be replenished at the expense of this reservoir. Conversely, low serum levels in general will indicate deficits of considerable magnitude. It has also been shown that sodium may replace potassium in the intracellular phase, especially when the latter ion is in short supply, and that this transference is accelerated by sodium administration, which will exaggerate potassium losses (21).

Darrow's very important observation of the coincidence of alkalosis with potassium deficit has been widely confirmed, although the mechanism is unknown. High bicarbonate levels on this basis are refractory to renal regulation with salt, but respond to potassium repletion therapy.

Regulation of the potassium metabolism is still not well understood. It is clear that desoxycorticosterone and other cortical substances exercise some direct effect, their administration or exogenous production leading to potassium loss along with sodium retention. It is also clear that renal control of potassium is not so exacting as that of sodium, so that losses will continue in the face of a severe deficit (4). Consequently, excretion of potassium, initially accelerated by the stress of disease or operation, will continue at a fairly constant rate even though the patient is in a negative potassium balance.

Surgical interest in potassium has largely centered around the problems of replacement of loss from the gastrointestinal tract and maintenance of patients for extended periods on parenteral therapy. In the therapy of such cases as duodenal fistula, ileostomy, and intestinal obstruction, the loss may be highly significant (50). A number of reports are presented on the value of potassium in parenteral maintenance, especially in protracted situations such as the delayed opening of a gastroenterostomy or small bowel anastomosis. Most of these cases re-emphasized the chemical finding of an elevated serum bicarbonate with potassium deficiency, and the clinical findings of lassitude, muscular weakness, and ileus. Moore's classic study on the metabolic response to trauma details the changes in potassium balance and provides a rational basis for administration.

Interest has also centered on the cardiotoxic effects of elevated serum potassium levels, both from the point of view of detrimental effects on anuric patients, and in regard to the use of this ion in the treatment of ventricular fibrillation, in which case it will arrest the heart, although leaving it less likely to resume normal rhythm than after electric shock. Electrocardiographic changes are common in anuria; serum levels may rise to a point where dialysis is necessary to prevent cardiac arrest.

The calcium ion has proved to be of importance largely in regard to parathyroid dysfunction, especially with regard to postthyroidectomy tetany and hypoparathyroidism following the removal of functioning adenomas. The influence of vitamin D on both intestinal absorption and renal tubular reabsorption of calcium makes these substances valuable adjuncts to the administration of calcium, which can generally be done orally. In some cases with advanced bone changes, calcium must be given intravenously to maintain serum calcium levels above the tetanic range after excision of a parathyroid tumor (1). The bone reservoir of calcium is so great that deficiency syndromes do not occur in surgical patients under ordinary circumstances; a few cases of tetany in acute pancreatitis have been reported because of the withdrawal of serum calcium to form insoluble soaps with fatty acids liberated by pancreatic lipase.

The surgical importance of magnesium is being evaluated currently. With the development of suitable methods of determining magnesium (36), negative balances have been shown in surgical patients (37), but the significance of these deficits is equivocal. Magnesium, like potassium, is a predominantly intracellular ion and is a catalyst for crucial enzymatic reactions, such as phosphate transfer.

Although the balance of fluids and electrolytes in surgical situations is at present well described and the therapeutic considerations seem well in hand, it is apparent that many fundamental mechanisms are understood only in a rudimentary fashion. The preservation of a high gradient across the cell membrane, the mechanism for replacement of potassium by sodium, the alkalosis attendant on potassium loss, the influence of changes in cellular environment on

intermediary metabolism, the mode of action of the adrenocortical hormones in mediating their profound effects—these things are all unsolved problems. The last 50 years have seen enormous progress in surgical physiology. In a survey of the vast extension of surgical activity in this half century, permeating every field of medical interest and providing often the most effective (or indeed the only effective) means of therapy, it is strikingly evident that the techniques involved belong to the preceding years in the majority of instances. It has been the ability to put them to widespread use with a high degree of safety which has characterized our era. Development in the understanding of shock, fluids, and electrolytes has played a very significant role in these advances and will undoubtedly continue to do so.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Analysis of 1,400 Cases of Acute Injury to the Head. G. F. Rowbotham, I. N. MacIver, June Dickson, and Marjorie E. Bousfield. *Brit. M. J.*, 1954, p. 726.

The results of an analysis of 1,400 cases of acute injury to the head are presented. Of these, 1,000 were adults and 400 children.

Among the 1,000 adults there were 175 deaths. In 87 cases death was due to road accidents; in 38 cases death resulted from accidents in industry. Of 175 patients admitted in a state of coma, 121 died. There were 28 patients with extradural hemorrhage and compression of the brain, in whom there was a latent interval of consciousness; one of these died before an operation could be performed, and of the 27 operated upon, 17 survived, and 10 died.

Among the 400 children up to the age of 12 years, the injuries were due to road accidents in 147 cases and to falling from a height in 149 cases. Thirty-four of the children died, 20 of them having been admitted in a state of coma.

In referring to the 175 adults who were in coma on admittance, the authors state that a high death rate from head injuries sufficiently severe to render a man comatose was expected, since it is in this group that severe associated injuries are usually encountered. From the surgical viewpoint, it is believed that the only procedure which might have been of value in this group of cases was drainage of the cerebrospinal fluid, either by lumbar puncture or through a trephine in the vault of the skull.

Of 101 patients admitted in a semi-comatose state, 27 (26.7%) died. Of 724 patients who were conscious or in a state of confusion, 27 (3.7%) died. In this group the causes of death were injuries to the brain unassociated with extradural hemorrhage, mild concussional injuries with severe injuries elsewhere in the body, extradural hemorrhages complicated by injury elsewhere in the brain, and injuries uncomplicated by extradural hemorrhages.

In presenting these figures on head injuries, the authors emphasize the fact that the subject is very important because of the high incidence of acute head injuries. It was hoped that through such a study, the definite need for further facilities in the treatment and rehabilitations of head injuries would be shown. A 7 day, 24 hour service is often necessary in caring for these injuries, as well as facilities for radiologic and all other ancillary investigations. In addition close cooperation between neurological and faciomaxillary surgeons is necessary in the treatment of head injuries.

—*John E. Karabin, M.D.*

The Radical Operation in Mixed Tumors of the Parotid Gland (Zur Radikaloperation der Parotismischtumoren). F. Rosenauer and H. Leidinger. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 107.

The authors have been much influenced in their modern methods of attacking mixed tumors of the parotid gland by the article of McNealy (*J. Internat. Coll. Surg.*, 1950, 13: 523), whose anatomical considerations are based upon the studies of Hamilton Bailey. These authors show the parotid gland as composed of two main lobes which are connected by a compact, relatively slender isthmus; the facial nerve is conceived of as dividing and passing around this isthmus. The branches are then shown as passing forward between the two lobes but not entering them. The authors in their cadaveric (11 cadavers) and surgical (11 patients) dissections of this region have not been able to find the anatomical relationships as simply constituted as those depicted and described by McNealy. In fact, the branches of the facial nerve in the authors' dissections always pierced the superficial lobe of the glands.

In the operations on the authors' patients intratracheal anesthesia was always used, the incision was that recommended by McNealy in the cited publication and illustrated (Fig. 1). In 2 instances the external carotid artery was ligated, as recommended by McNealy; however, since the introduction of hypotension this has not been found necessary. The main trunk of the facial nerve is then exposed behind the gland and traced into it. By this means the tumor could always be radically removed—not merely enucleated—without irreparable injury to any important branches of the facial nerve.

By this technique 11 mixed parotid tumors have been radically extirpated. All of these tumors were located in the "superficial lobe." All proved histologically to be mixed tumors without evidence of malignant degeneration. Following these 11 operations there has not been a single recurrence.

The only other important complication to be considered is the salivary fistula, of which the authors have not seen a single instance. Stensen's duct takes origin from the "superficial lobe." The authors have the impression that in every instance in which they

have removed the entire superficial lobe of the gland they have cut it somewhere or other, but nevertheless they have never observed a fistula. They believe that McNealy (although he has not been explicit on the subject) must have cut the excretory parotid salivary duct as he also demands the removal of the entire superficial lobe of the gland.—*John W. Brennan, M.D.*

EYE

A Simplified Ptosis Operation. CHARLES E. ILIFF. *Am. J. Ophth.*, 1954, 37: 529.

THE operation presented is a simplified modification of the usual levator resection. It is recommended for cases of ptosis which show any small amount of levator action.

The procedure shortens the levator tendon, Muller's muscle, and the palpebral conjunctiva of the superior fornix. This conjunctival shortening may enhance the corrective value of the surgery by making taut the attachments between the upper cul-de-sac and the sheaths of the levator and Muller's muscle. Additional support is obtained by reattaching the advanced levator tendon to the septum orbitale.

General anesthesia is used. The eye is prepared as usual, and the upper lid is everted with a Desmarres lid retractor. The everted lid throws the superior edge of the tarsus into prominence.

A stab wound is made through the conjunctiva at the temporal and nasal ends of the exposed tarsus, into the potential space between the tarsus and skin. One jaw of the levator clamp is inserted through the temporal stab wound and is passed along the space between the tarsus and the skin, emerging through the nasal stab wound. Little resistance to the passage of the clamp is met.

The clamp is tightened and includes between its jaws the superior margin of the tarsus to which is attached Muller's muscle, the superior tarsal arcuate vessel, and levator which lies anterior to the tarsus.

An incision through the tarsus and levator tendon is then made by cutting along the distal edge of the levator clamp. When the cut edge is lifted away, the dissection is extended backward anterior to the levator tendon and posterior to the septum orbitale. The septum is clearly visible at this stage.

The structures held by the clamp are put on the stretch and a row of four double-armed sutures (3–0 silk) is placed 13 mm. from the cut tarsal edge. The whole thickness of tissue is then excised distal to the suture line.

As each suture is brought forward, a small bite of the edge of the septum orbitale is taken. The sutures are then passed anterior to the tarsus and brought out through the skin behind the cilia and tied over glass beads. The tension on the sutures is adjusted to give a smooth lid line and the sutures are cut long.

A Frost suture is used to close the eye and it is removed at the first dressing, 24 hours later. If any overcorrection is present at this time, it is possible to correct it by loosening the sutures.

The sutures are removed on the fifth day. The edema usually subsides within 2 weeks and the full effect of the operation is seen in 5 or 6 weeks.

—*Henry M. Dismukes, M.D.*

FIG. 1 (Rosenauer, Leidinger). From McNealy after Hamilton Bailey. A deep and a superficial lobe are described, connected by an isthmus. The authors could not demonstrate such definite relationship either in radical operations or in cadaver dissections, nor could they find it confirmed in the literature.

Iridectomy in Narrow-Angle Glaucoma. OTTO BARKAN. *Am. J. Ophth.*, 1954, 37: 504.

ONE-HUNDRED cases of narrow-angle glaucoma were studied with the object of determining the mode of action of iridectomy in relieving this condition.

In each case the usual slit lamp examination of anterior segment was done; the angle of the anterior chamber was studied with the Koeppe contact lens (magnification 30x), and the axial depth of the anterior chamber was determined with the Ulbrich drum.

A preliminary study of various types of iridectomy (Graefe scleral incision, *ab externo* incision with and without sutures, corneoscleral trephination, iridencleisis, and beveled self-sealing corneal keratome incision) was made, and the author concluded that any incision which is not sealed encourages delayed reformation of the anterior chamber, adhesions in the angle, and a forward displacement of the lens-iris diaphragm. For this reason the iridectomies reported were either done through a valvelike corneal keratome incision or a small sutured *ab externo* incision.

The action of peripheral iridectomy performed through an incision which is immediately and completely sealed was found to be as follows:

1. The anterior chamber is retained, or if it is lost in part it reforms at once.

2. Collapse of iris bombé occurs immediately, widening the angle throughout its circumference and giving adequate access to the trabecula.

3. When the iridectomy is truly basal, widening of the angle is greater in the region adjacent to the coloboma.

4. In many cases a measurable increase in the axial depth of the anterior chamber was found immediately or in the course of months.

5. Pressure-reducing effects of iridectomy appeared to parallel the extent and degree of mechanical opening of the angle. This would make it appear unlikely that the operation acts by interruption of nerve reflexes.

6. Normally, the trabeculum was found to be permeable in narrow-angle glaucoma until contact between it and the root of the iris occurs.

7. Iridectomy prevents acute attacks, but the pressure may rise temporarily during periods of stress.

8. Miotics were found to be markedly more effective following adequate iridectomy.

Failures of iridectomy were attributed to the following causes:

1. Improper selection of cases (wide-angle glaucoma).

2. Techniques which resulted in delayed reformation of the anterior chamber and anterior peripheral adhesions of the iris.

3. Lack of basality of the coloboma which diminishes the angle-widening effect.

Barkan summarizes his opinion of the value of iridectomy as follows:

"In the early stage of narrow-angle, both congestive and noncongestive before adhesions have formed or the trabeculum has been damaged, peripheral irridectomy *ab externo* with a very small sealed incision is consistently effective in normalizing pressure."

—*Henry M. Dismukes, M.D.*

Further Studies on the Effect of Agents on Regeneration of Corneal Epithelium. William G. Marr, Ronald Wood, and Martha Grieves. *Am. J. Ophth.*, 1954, 37: 544.

The authors report a continuation of their study, the earlier results of which were published in 1951. At that time, it was reported, they found that streptomycin, chloromycetin, aureomycin, and terramycin (in concentrations used clinically and with *p*H at 7.2) did not delay the healing of epithelial defects in the rat's cornea. The same results were found for the sodium or potassium salts of penicillin in concentration of 2,500 units per cubic centimeter. Zephiran, phemerol chloride, butyn sulfate, and tetracaine were found to delay healing.

The present report presents the results with antiseptics and antibiotics not previously tested, and in addition an evaluation, within the limitations of the technique employed, of the stimulatory action of calsulfhydryl on corneal epithelization.

The technique of the experiments was the same as that employed in the previous study. Using a fine needle, a small circular defect was made in the epithelium of the cornea of an anesthetized rat's eye, the eye enucleated, and placed in the test solution of the agent under study. The *p*H of the solutions was maintained at neutrality with Sorensen's phosphate buffers, and each solution was aerated for 3 hours at a temperature of 38 degrees C. The eyes were then removed and the corneas were prepared for microscopic examination of the epithelial defect. Control eyes were placed in Sorensen's phosphate buffer solution for 3 hours under the same conditions. The results were as follows:

Polymyxin B. sulfate did not delay healing in a concentration used chemically of 20,000 micrograms per milliliter.

Erythromycin in concentration of 2.0 micrograms per milliliter did not delay healing.

Viomycin sulfate in concentration of 2.5 mgm. per milliliter showed no inhibition of healing.

Carbomycin (magnomycin hydrochloride) in a concentration of 500 micrograms per milliliter did not interfere with healing.

Neomycin sulfate did not delay healing in the therapeutic concentration of 3.5 mgm. per milliliter.

Circulin prevented healing in a concentration of 3.5 mgm. per milliliter, but normal healing took place in a concentration of 1.0 mgm. per milliliter.

MK-65, a new broad range antibiotic, did not prevent healing in a concentration of 5.0 mgm. per milliliter.

Nitrofurazone (furacin) in the concentration used clinically (0.2 mgm. per ml.) retarded healing, but in a weaker strength solution (0.02 mg. per ml.) normal healing took place.

Sodium propionate prevented healing in the 5 per cent concentration used therapeutically, but in 0.5 per cent strength healing was unimpeded.

Sulfamylon prevented healing in the therapeutic strength and also in weaker solutions.

Gantrisan solution (4 per cent) diluted 1:5 did not retard healing.

Calsulfhydryl was used undiluted and also in 1:40 dilution. Eyes in the undiluted solution showed no evidence of healing, while those in the diluted solution showed retarded healing. In all cases control eyes showed more healing than did those in the calsulfhydryl solutions. —*Henry M. Dismukes, M.D.*

Complications Following Cataract Extraction, with Emphasis on Pathologic Documentation. Joseph A. C. Wadsworth. *Am. J. Ophth.*, 1954, 37: 672.

Postoperative infection may be bacterial, due to sensitivity to lens protein, if the extraction is extracapsular, or may be sympathetic in nature. Glaucoma may occur after any inflammatory process that results in the formation of posterior synechiae. Prolapse of the iris, if small and covered by a conjunctival flap, may not require excision. Corneal trauma, occurring during delivery of the lens, or by contact with the hyaloid membrane, causes damage to the cornea which may be permanent, with opacification. Delayed restoration of the anterior chamber frequently results in secondary glaucoma through the formation of peripheral anterior synechiae. Epithelization of the anterior chamber also follows poor wound closure. Rupture of the lens capsule during extraction, with incarceration of the capsule in the corneal section delays healing. Proliferation of the lens epithelium with the formation of Elschnig's pearls may occur after extracapsular extractions. Intra-

ocular hemorrhage causes secondary glaucoma and vitreous opacities. Hemorrhage may be from a scleral section, from granulation tissue in the wound, or from rupture of a choroidal vessel (expulsive hemorrhage). The loss of normal vitreous results in glaucoma, displacement of the pupil, and retinal detachment.

The use of right-handed or left-handed scissors is suggested as one means of decreasing the incidence of some of the complications. A large iridotomy or an iridodialysis may occur from the improper use of scissors in enlarging the section. —*J. Jack Stokes, M.D.*

Systemic Complications of Retinal Detachment Surgery. DAVID SCHER. *Am. J. Ophth.*, 1954, 37: 582.

THE author reviews a series of 263 patients admitted to hospital with a diagnosis of retinal detachment with the view of establishing the incidence of postoperative systemic complications.

Two hundred and ten of these patients were subjected to 274 operations.

Twenty-one systemic complications, other than ocular, occurred—an incidence of 8 per cent. These complications included vascular cardiac, gastrointestinal, respiratory and urinary conditions, acute gouty arthritis and hiccups.

One death occured due to cardiac failure.

No correlation could be established between the period of bed rest and the occurrence of systemic complications. —*J. Winston Duggan, M.D.*

Pathological Study of Retinoblastoma Treated by Radon Seeds and Radium Discs. H. B. STALLARD. *Arch. Ophth.*, Chic., 1954, 51: 573.

THE first portion of the present article is descriptive of the histopathologic changes which occur in retinoblastoma subjected to irradiation.

The author has developed a technique of irradiation in which he uses radon seeds and circular discs containing radium or radioactive cobalt. These are secured to the sclera in the region of the tumor.

The dosage is empirical. The amount suggested seems small in relation to the effective dose required for similar malignant tumors.

The results in 36 cases suggest that when one-third or less of the retina is involved, there is reasonable hope that the tumor may be destroyed by radiation therapy. If one-half or more of the retina is involved, the results are poor. Complications associated with therapy include cataract formation, retinal hemorrhages, intraocular hemorrhage, iridocyclitis, glaucoma, and endophthalmitis.

The author believes that this technique is superior to radium needles fixed in Columbia paste, plaques, or the radium "bomb." He also considers that it offers fewer technical disadvantages than deep X-ray therapy. —*J. Winston Duggan, M.D.*

MOUTH

The Surgical Treatment of Prognathism; an Analysis of 65 Cases. VARAZTAD H. KAZANJIAN. *Am. J. Surg.*, 1954, 87: 691.

THE aim of surgical treatment of prognathism is to improve the external appearance of the patient and to give better masticatory function of the teeth.

This article is based on the study of 65 cases in which an attempt was made to evaluate the relative merits of the operative procedures.

A number of operative procedures have been recommended, but there are only two that are widely used today.

One approach is that of resecting a measured portion of bone from each side of the body of the mandible and immobilizing the anterior segment back in its new position. This operation improves the general appearance of the face but does not always obtain the maximum efficiency of the masticatory function of the teeth. The second approach is that of osteotomy through the rami above the level of the mandibular canals and retroposition of this lower fragment to the desired occlusion where it is immobilized. This operation may be performed by: (1) the closed method and (2) the open method.

The advantages of cross-sectioning the ramus are: (1) it is probably a simpler procedure, (2) there is no interference with the inferior alveolar nerve, and (3) greater efficiency of mastication is obtained as no teeth are sacrificed.

The unfavorable results of the surgical treatment of prognathism are: (1) imperfect cusp relationship; this is not serious, can be easily remedied, and is not uncommon regardless of the procedure used; (2) open bite, slowly developed postoperatively only in those patients in whom the rami were sectioned; and (3) nonunion.

Infection is more likely to be the cause of nonunion when the operation is performed through the body of the mandible as the operative field is exposed to the oral cavity. However, with adequate immobilization and the use of antibiotics the danger of infection is minimized.

Since 1945 Kazanjian has modified the technique with gratifying results. The lateral surface of the ramus is exposed through an incision below the angle of the jaw, according to the Risdon technique. The bone is cut transversely with an osteotome on a broad slant. This bevelled cut (1) affords greater contact area between the fragments, (2) avoids the inferior alveolar nerve, and (3) prevents any medial displacement of the upper fragments by this pull of the internal pterygoid muscle. Also, this procedure is under direct vision.

For prognathism with open bite, resection of bone from the body of the mandible is recommended.

Surgery on adolescents with prognathism is not recommended before the age of 17 or 18 except as a health problem, and resection of both sides of the mandible is then favored.

No single procedure is suitable for surgical correction of all types of mandibular deformities, and a careful study of each individual case must be made.

—*John R. Lindsey, M.D.*

Unilateral Hypertrophy of Masseter Muscle. JOHN A. DRUMMOND and C. A. MCINTOSH. *Am. J. Surg.*, 1954, 87: 711.

SO FAR as can be determined, only 7 cases of simple idiopathic hypertrophy of the masseter muscle have been reported. In 6 cases the condition was bilateral, and in 1 case, unilateral.

The etiology of both bilateral and unilateral hypertrophy of the masseter muscle is obscure. Bilateral hypertrophy is seen quite frequently, in varying degrees, as a congenital or racial characteristic, or may be a work hypertrophy in what Boldt called "mouth athletes."

Suggested causes of unilateral hypertrophy are temporomandibular joint derangements, defective dentition, and faulty chewing habits. Two cases are reported.

The first case was that of a 28 year old male who complained of a painless enlargement just above and anterior to the angle of the jaw on the right side, which had been noticed for 2 years; it had gradually increased in size for 1 year, and then remained stationary. Examination showed a diffuse swelling of the right side of the face above and anterior to the angle of the mandible, which was smooth, nontender, and of the consistency of muscle tissue. The upper margin was indefinite and the lower margin followed closely the line of the masseter muscle. With the jaws tightly closed, the mass became prominent, fixed, and very firm. The overlying skin was normal and fairly movable. Otherwise, the physical examination was essentially normal. The patient did not desire cosmetic correction, but because of his anxiety the mass was biopsied under local anesthesia. The pathologic report was: "Sections from muscle show bundles of uniform striated fibers of normal size and appearance. There is no suggestion of any neoplasm."

The second case was that of a 32 year old male physician from India, with right simple masseter hypertrophy since the age of 19, which had increased in size up to about the age of 23 years. There was no other significant contributory history. Clinical findings were essentially the same as those in case I. Since the deformity was neither a psychological or physical handicap, the patient did not desire surgical correction.

There is little justification for surgery except for cosmetic reasons. If cosmetic correction is desired, an operation such as has been described by Gurney or Adams would be the treatment of choice.

—John R. Lindsay, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Contribution to the Problem of Intracranial Cerebral Pulsation (Zur Frage der intrakraniellen Hirnpulsation). HELMUT SIGWART. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 115.

THE patient, a 63 year old woman, a schizophrenic, was subjected to a transorbital leucotomy. In order to mark the direction of the incision, small instillations of iodipin were made (Klar). Some of these deposits of contrast material were in the immediate vicinity of the main branches of the anterior cerebral artery, yet on the kymogram, both with vertical and with horizontal grid, no evidence of movement of these deposits could be elicited.

In the discussion of the result the author recalled the adhesive effect of the closed skull with reference to its content of airless, fluid character, rendering it impossible for the brain to become perceptibly smaller except by displacement of fluid from the ventricles.

Considering this last possibility the comparison is made with a sphere with the same approximate radius as the brain would assume under like conditions (7 cm.). This sphere would have a volume of 1449.36 c.cm. and an increase of 1 mm. in its radius (Stumpf himself asserts that 0.5 to 1 mm. is the smallest radius of pulsation which can be detected by the kymograph) and would require a displacement through the foramen magnum of more than 49 c.cm. of cerebrospinal liquor. This expedient is unphysiological to the highest degree and, in consideration of the inertia and weight of the brain mass, would be physically impossible.

Thus, the author believes that he has demonstrated both theoretically and kymographically that cerebral pulsations, such as are observed through openings in the cranium, do not occur in the closed cranial cavity.

—*John W. Brennan, M.D.*

Experimentally Produced Cerebral-Venous Obstruction. A. L. WOOLF. *J. Path. Bact.*, Lond., 1954, 67: 1.

WOOLF ligated the superior sagittal sinus in cats and injected lard oil into the ligated portions in an attempt to reproduce Putnam's experimental results of 1935. At that time, Putnam reported that the lesions produced by this technique were strikingly similar to those seen in multiple sclerosis. He concluded that venular obstruction was almost inevitably the essential immediate antecedent to the formation of typical sclerotic plaques. After sinus ligation, in both dogs and cats, Woolf found that diffuse destruction of nerve fibers and gliosis may develop in adjacent white matter without the formation of compound granular corpuscles. When these cells are encountered, they are actually found only in association with areas of total destruction of the tissue. He concluded that in these respects the experimental lesions differ in their histopathology from both the classical form and the shadow plaques of disseminated sclerosis.

Contrasting the effects of venous obstruction with arterial obstruction, Woolf found that the former lesions characteristically showed a bilateral spongy gliosis of the white matter, with diffuse degeneration and loss of myelin sheaths. The process was most marked nearest to the sinus. Contrastingly, after arterial fat embolism via the carotid artery the picture showed discrete, chiefly cortical, softening, with regressive changes in the astrocytes, and the striking formation of compound granular corpuscles. The author suggests that the venous lesions are secondary to edema and the arterial lesions, secondary to anoxia.

—*Edward B. Schlesinger, M.D.*

SPINAL CORD AND ITS COVERINGS

High Cervical Chordotomy for Relief of Intractable Pain in the Arm, Shoulder, and Upper Chest. GILBERT HORRAX and WILLIAM T. PRICE, JR. *Ann. Surg.*, 1954, 139: 567.

IN THE past, high cervical cordotomy has not been much used because of the presumed danger of respiratory embarrassment. This problem was not encountered in this series of 12 patients operated upon since 1940. Intractable pain in the lower part of the neck, the arm, and upper chest was treated. There was 1 operative death. In addition to the chordotomy, posterior rhizotomy was done also to raise the level of analgesia. In 7 cases, the cause of pain was due to malignant disease, either primary or metastatic, which included 3 cases of bronchogenic carcinoma, 1 case of adenocarcinoma of the breast, 1 of adenocarcinoma of the thyroid, 1 of renal carcinoma and 1 of sarcoma of the shoulder. The exact cause of the pain was not certain in 3 cases; in 1 case the pain was due to cervical osteoarthritis and in another it was secondary to an osteoma of the seventh cervical vertebra.

The patients were operated upon in the prone position with an endotracheal general anesthetic supplemented by local infiltration. One patient was reoperated upon with local anesthesia, but the authors believe that this offered little advantage and was arduous for both the patient and surgeon. A laminectomy of C2 and C3 was done and the dura was opened in the midline, the arachnoid being left intact. The dentate ligaments, one or two on both sides, were divided and the cord was rotated. The authors believe that bilateral section of the posterior roots of C2 and C3, in order to facilitate rotation and prevent incisional pain, would be of definite merit. The fibers of the anterolateral column are picked up on a Frazier hook and sectioned (under visualization) until nearly all of the nerve tracts occupying the anterolateral quadrant are divided.

Analgesia, hypalgesia, thermanesthesia, and thermhypesthesia were the only sensory findings that followed chordotomy alone. Good results were obtained in 8 patients, some improvement was found in 1 patient; 1 result was a complete failure, while the others were only partially successful. The failure occurred in a psychoneurotic patient with deep diffuse burning pain associated with paresthesia. Sensory levels were

usually found no more than two segments below the chordotomy incision. In 2 patients bilateral section was done in stages, never simultaneously. Complications were minimal and limited to transient fecal and urinary incontinence. No persistent motor weakness was seen. The 1 postoperative death occurred on the eighth day of respiratory failure probably aggravated by previous thoracoplasty.

High cervical chordotomy can be evaluated only in comparison to the other neurosurgical measures available for cervical pain and pain in the upper extremity, i.e., rhizotomy, mesencephalic or medullary tractotomy, and lobotomy, all of which are either quite hazardous, unpredictable, or functionally disabling. Hence it is believed that this procedure offers much and can be of great use if properly employed.

—*Nicholas Wetzel, M.D.*

PERIPHERAL NERVES

The Management of Pain of Malignant Disease with Nerve Blocks. JOHN J. BONICA. *Anesthesiology*, 1954, 15: 280.

THE nonsurgical management of pain due to malignant disease is discussed by Bonica. He offers a careful analysis of his own results with nerve-blocking procedures, including the degree of relief obtained, and details of complications, both major and minor. His series includes injections of the cranial nerve, peripheral nerve, and paravertebral and subarachnoid regions along with block of the autonomic pathways. The varying indications and potential opportunities for the relief of symptoms are discussed. Illustrative case histories are appended. The actual technique and anatomical details are not dealt with in this comprehensive review of the subject.

—*Edward B. Schlesinger, M.D.*

SYMPATHETIC NERVES

Sympathectomy in the Treatment of Benign and Malignant Hypertension. A Review of 76 Patients. C. J. LONGLAND and W. E. GIBB. *Brit. J. Surg.*, 1954, 41: 382.

IN AN attempt to evaluate more fully the benefits of sympathectomy, the authors reviewed 76 cases of arterial hypertension in patients who had been operated upon since 1937 at St. Bartholomew's Hospital. The cases were graded according to the fundus changes on a modification of the Keith, Wagener, and Barker classification, as follows:

Grade I—normal fundi, mild narrowing or sclerosis of arteries.

Grade II—marked sclerosis, usually with arteriosclerotic compression, with or without hemorrhages.

Grade III—Retinitis (characteristically cotton-wool patch exudates) with or without arterial changes.

Grade IV—Grade III with papillary edema.

Grades I and II are considered as benign hypertension, grades III and IV, malignant hypertension.

Some cases were placed in an intermediate group, as these patients had had only one or two hemorrhages in the fundus, which otherwise showed only arteriosclerotic changes, and were thought not to warrant being placed in group III.

Patients were operated upon for one or more of the following reasons:

Symptoms demanding relief: intractable headache; visual defect; encephalopathy, dyspnea, fatigue, and exhaustion.

Evidence of progressive disease: malignant hypertension; high pressure in young people; nephritis.

In this series, several operations were tried.

Results of sympathectomy in cases of malignant hypertension were not too encouraging. Seventy-one per cent of the patients had a significant blood pressure fall on discharge from the hospital, but only 28 per cent have significantly lowered blood pressures 3 years after operation. The percentage of survivals among patients with malignant hypertension was no greater.

The intermediate group presented a better prognosis. Relief of symptoms was noted in four-fifths of these patients; a small percentage did have a prolonged significant reduction of blood pressure.

There is some evidence that thoracolumbar sympathectomy was more efficacious than lesser procedures. It has been shown that the vessels of the splanchnic region behave in a similar way to those of the foot after sympathetic degeneration.

The authors suggest that the treatment of hypertension by sympathectomy may be undertaken to relieve intractable conditions and to give patients with very high pressure a period of relief. The duration of the lowered pressure cannot be foretold.

—*John R. Lindsay, M.D.*

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Gynecomastia: A Review and An Analysis of 160 Cases. CLAYTON E. WHEELER, EDWARD P. CAWLEY, HENRY T. GRAY, and ARTHUR C. CURTIS. *Ann. Int. M.*, 1954, 40: 985.

GYNECOMASTIA implies a circumscribed, potentially reversible enlargement of the male breast which results from a combination of changes in the breast, including a nonencapsulated increase of connective tissue, proliferation of the ducts of the mammary gland, increased vascularity, and infiltration by chronic inflammatory cells. The bulk of the enlargement lies directly under the nipple and areola. Current theories regarding the etiology of gynecomastia are: (a) it results from the administration of hormones; (b) it occurs in conjunction with physiologic processes which are productive of hormonal imbalance, and (c) it occurs in conjunction with pathologic states which are productive of hormonal imbalance.

A clinical classification of conditions associated with gynecomastia is suggested on the basis of information gleaned from the literature and from an analysis of the 160 cases reported herein.

I. Gynecomastia occurring as a result of a physiologic process:
   1. Transitory gynecomastia of the newborn
   2. Gynecomastia of puberty
   3. Gynecomastia of hormone administration: (a) estrogens, (b) androgens, (c) chronic gonadotrophin and (d) desoxycorticosterone acetate and other adrenal hormones.

II. Gynecomastia occurring as a result of a pathologic process:
   1. Testicular disease: (a) malignant tumors; (1) hormone secreting and (2) nonsecreting; (b) benign tumors, (c) atrophies, (d) inflammations, (e) castration and surgical removal of testicular tissue, (f) cryptorchidism, and (g) Klinefelter's syndrome.
   2. Pulmonary disease: (a) bronchogenic carcinoma, (b) bronchiectasis, (c) pulmonary tuberculosis, (d) empyema, and (e) pneumonia.
   3. Cardiovascular disease: (a) hypertension, and (b) congestive heart failure.
   4. Renal disease: (a) chronic pyelonephritis, (b) chronic glomerulonephritis, and (c) renal neoplasm.
   5. Hepatic disease: (a) cirrhosis, (b) hepatitis, and (c) carcinoma.
   6. Thyroid disease: (a) hyperthyroidism, untreated, and (b) hyperthyroidism treated with I^{131} and propylthiouracil.
   7. Nervous system disease: (a) transverse myelitis with paraplegia, and (b) other diseases of the spinal cord.
   8. Skin disease: (a) generalized exfoliative dermatitis, and (b) generalized psoriasis.
   9. Pancreatic disease: (a) diabetes mellitus.
   10. Adrenal disease: (a) malignant tumor, (b) hyperplasia, and (c) benign tumor.
   11. Pituitary disease: (a) acromegaly, (b) basophilic adenoma, and (c) chromophobe adenoma.
   12. Hermaphroditism: (a) true, and (b) pseudo hermaphroditism.
   13. Pineal gland disease: (a) tumor.
   14. Gastrointestinal tract disease: (a) chronic ulcerative colitis, and (b) appendicitis with prolonged convalescence.
   15. Bone disease: (a) chronic osteomyelitis, (b) sarcoma with pulmonary metastasis, and (c) multiple fractures.
   16. Collagen disease: (a) rheumatoid arthritis, and (b) angiodermatomyositis.
   17. Lymphoblastoma: (a) mycosis fungoides, and (b) others (?).
   18. Malnutrition: (a) starvation, (b) protein deficiency, and (c) vitamin B deficiency.
   19. Albright's disease.
   20. Prostatectomy.

A previously unrecognized or unstressed relationship was found between gynecomastia and the following conditions: chronic generalized dermatitis, rheumatoid arthritis, angiodermatomyositis, lymphoblastoma, diabetes mellitus, chronic pyelonephritis, chronic glomerulonephritis and essential hypertension. Gynecomastia beginning before the age of 25 was usually a manifestation of puberty. Gynecomastia beginning after the age of 25 was usually a manifestation of a serious underlying disease. Gynecomastia was occasionally the initial manifestation or the presenting complaint of a serious underlying disease.

—*Earl O. Latimer, M.D.*

The Influence of Sex Hormones upon Erythrocyte-Phosphatase and Erythrocyte Magnesium in Breast Cancer (Einfluss der Sexual-hormone auf Erythrocytenphosphatase und-magnesium beim Brustkrebs). S. VON NIDA and L. HUEBER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 148.

BIOCHEMICAL and pathophysiological facts, theories, and hypotheses regarding the influence of sex hormones are reviewed. The case histories of 5 women with breast cancer are given. The values of acid phosphatase and erythrocytemagnesium were studied in these women, as well as in 8 patients without cancer for control.

The following facts were observed:

The basis for tumor anemia is a disturbance of the acid phosphatase and erythrocytemagnesium balance. The acid phosphatase is increased and the erythrocytemagnesium is diminished. The disturbances seem to take place in the erythropoietic system and appear to be influenced by pituitary and adrenal activity. The type, localization, and size of the tumor, as well as the magnesium reserves, have a further influence on the relationship between the acid phosphatase and magnesium.

The increase in acid phosphatase is explained by its accumulation and nonutilization caused by the diminishing of the magnesium which activates it.

The balance of acid phosphatase and magnesium within the erythrocytes can be established by an increase of pituitary-adrenal activity by means of the administration of sex hormones or castration, provided the mineral reserves are adequate.

These investigations give no information as to the role of acid phosphatase in blood formation.

It is assumed, however, that acid phosphatase favorably influences the maturation of cells and prepares the permeability of the cell membrane for utilization of useful substances. —*Otto Weiss, M.D.*

Carcinoma Originating in an Aberrant Presternal Mammary Lobe; Contribution to the Study of the Tumors of Aberrant Mammary Glands (Carcinoma insorto su lobo aberrante mammario a sede presternale; Contributo allo studio dei tumori delle ghiandole mammarie aberranti). GIOVANNI MACONI. *Riforma med.*, 1954, 68: 589.

THE author reviews the most accepted classifications in the European literature regarding the embryology and anatomical location of aberrant mammary glands. He points out the importance of a distinction between aberrant mammary glands and aberrant mammary lobes. The former are on the milk line of Schultze and are characterized by an autonomic secretory system, areola and nipple; the latter are less common and are formed by isolated fragments of mammary tissue without a secretory system.

An instance of carcinoma of an aberrant mammary lobe located on the right side of the sternum is presented. The patient was 69 years of age. The tumor was approximately 6 cm. in diameter, round, and apparently independent from the normal right breast. The mass was fixed to the skin and deep tissues; it was as hard as cartilage and nontender. The mass was removed with an elliptical incision followed by cauterization of the sternal periosteum. There was no relationship to the right main breast, and no regional lymph node involvement was noted.

The author emphasizes the high incidence of neoplasms, benign and malignant, in aberrant mammary tissue. In cases of carcinoma of the aberrant axillary lobes, the main mammary gland is involved in most instances. The surgical treatment of these tumors is controversial as to the extent of the excision. There are, the author points out, two schools of thought: one favors simple excision limited to the aberrant tissue and the other favors radical mastectomy as a routine procedure regardless of the clinical evidence of tumor extension to the main breast.

—*Roger H. L. Wilson, M.D.*

Mammary Cancer Treated by Bilateral Adrenalectomy. L. N. PYRAH and F. G. SMIDDY. *Lancet*, Lond., 1954, 1: 1041.

THE authors present a review of 22 cases of advanced mammary cancer with metastases, in which bilateral adrenalectomy and bilateral oophorectomy were performed. It has been known that some cancers of the breast and of the prostate gland are influenced by the host's hormones. Surgical removal of the source of such hormones may cause regression of the growth; this has happened after oophorectomy for mammary carcinoma and, more often, after orchectomy for prostatic carcinoma. These neoplasms are called dependent or conditioned neoplasms. It has been generally accepted that a relationship does exist between the female breast and ovarian hormones, and between some mammary cancers and ovarian and testicular hormones.

Of the 22 patients treated by bilateral adrenalectomy and bilateral oophorectomy, 1 died soon after the operation, and 8 have died either from cancer or have shown no improvement; 10 have improved and 5 of these had a major remission. This work confirms the work of Huggins and other coworkers that a favorable response sometimes follows bilateral adrenalectomy and bilateral oophorectomy. Further observation of all the cases and extension of the series are necessary before an accurate long term estimate of this operation can be made. The authors, at some convenient date after operation, usually insert a 300 mgm. pellet of deoxycortone acetate subcutaneously. The administration of cortisone is essential to life after adrenalectomy. The substitution therapy is given before and after operation and the dosage should be in excess of need preoperatively, and gradually reduced postoperatively. The routine recommended by Huggins has been used and has proved satisfactory, as follows:

Day before operation. Cortisone acetate, 50 mgm. 6-hourly intramuscularly; deoxycortone acetate, 3 mgm. intramuscularly; sodium chloride, 3 gm. by mouth.

Day of operation. Cortisone acetate, 150 mgm. an hour before operation and 50 mgm. 4-hourly intramuscularly; deoxycortone acetate, 5 mgm. intramuscularly.

First postoperative day. Cortisone acetate, 50 mgm. 6-hourly intramuscularly; deoxycortone acetate, 5 mgm. intramuscularly; sodium chloride, 3 gm. by mouth.

Postoperative days 2 to 6. Cortisone acetate, 50 mgm. 12-hourly by mouth; deoxycortone acetate, 3 mgm. intramuscularly; sodium chloride, 3 mgm. by mouth.

After sixth postoperative day. Cortisone acetate, 25 mgm. by mouth twice daily; deoxycortone acetate, 0.3 mgm. intramuscularly daily; alternatively, 300 mgm. implanted subcutaneously once every 6 months, by mouth sodium chloride, 3 gm.

—*John E. Karabin, M.D.*

Result of Radical Surgery for Mammary Cancer (Ergebnisse der Radikaloperation des Mammacarcinoms). H. BRUCK and W. LORBEK. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 134.

THE authors have studied and re-examined as well and as extensively as possible, the material on all mammary cancers treated at the Second Surgical Clinic of the University of Vienna from 1936 to 1952.

Combined radical surgery and postoperative roentgen therapy of female breast cancers resulted in 61.1 per cent of 5 year cures.

For prognosis, the importance of the histopathological nature of the tumor, its stage, and the patient's age are stressed. Breaking down this material, the

authors found 5 year cures for scirrhous cancers in only 42.6 per cent and for solid scirrhous cancers in 57.1 per cent. For solid cancer the 5 year cure was 71.1 per cent. Thirteen of 14 patients with gelatinous cancer and 12 of 15 with solid medullary cancer had 5 year cures. The most malignant of all was a large-cell cancer. In this group, only 2 of 11 patients lived 5 years postoperatively. Patients more than 60 years of age have a better prognosis. Patients between 40 and 60 years have the least chance of survival.

Early diagnosis and surgery is the surest and only way to improve results and is much more important than changes in the surgical or radiological technique.

Even patients with recurrence after surgery live longer than patients without operation. Only very old and decrepit persons were treated with x-rays alone when the tumors were still operable. The results were gratifying.

In these studies, only 30.8 per cent of the patients were nulliparous. Their chances are from 7 to 8 per cent better than those of multiparous women.

The difference in 5 year cures between women still menstruating and those in the menopause amounted to only 2.5 per cent in this material and, therefore, conclusions cannot be drawn.

Radical mastectomy with removal of the larger and lesser pectoralis muscles and precise dissection-evacuation of the axilla constituted radical surgery. Splitting of the sternum was not practiced.

Postoperative radiation consisted of 600 roentgens to 3 fields (mammary gland, axilla, and supraclavicular fossa) in three series. Very lately, 2,400 roentgens were given to each field in a single sitting.

—Otto Weiss, M.D.

TRACHEA, LUNGS, AND PLEURA

Gastropleural Fistula (Fistola gastro-pleurica). C. Brondi and M. Scaccianoce. *Gior. ital. chir.*, 1954, 10: 377.

The authors present an unusual case of gastropleural fistula and discuss the etiologic possibilities.

The case was that of a 26 year old woman who was in good health until the delivery of her fifth child. In the postpartum period, the patient developed a persistent metrorrhagia and a septic temperature. The metrorrhagia was controlled, but the sepsis, asthenia, and chronic anemia persisted. Examinations of the blood were negative for specific organisms. On a routine chest roentgenogram, the patient was found to have a left pneumothorax with a fluid level extending to the fourth intercostal space. This was aspirated and about 400 c.c. of turbid yellow fluid were removed. This was done daily without improvement. A thoracotomy was done to allow adequate drainage, and digested food was noted to exude from the wound. Barium studies revealed that there was a communication between the greater curvature of the stomach and the pleural cavity through the diaphragm. An exploratory laparotomy demonstrated that the greater curvature of the stomach and the spleen were incorporated into a mature fibrous and granulating mass which was adherent to the diaphragm. As this was exposed, a 3 cm. defect in the gastric wall was seen to perforate the diaphragm and drain into the pleural cavity. This area was resected together with the spleen, and the remaining defect in the diaphragm and stomach was closed with interrupted catgut sutures. The patient made an uneventful recovery.

Tuberculosis, syphilis, mycotic infections, tumors, and trauma were investigated as the possible etiological agents. The past history was entirely negative, and the authors are of the opinion that this lesion was caused by a silent ulcer of the greater curvature of the stomach with perforation and fistula formation.

—Roland A. Manfredi, M.D.

Complications Associated with Resective Operations for Pulmonary Tuberculosis. Robert P. McBurney, Gustaf A. Hedberg, Robert W. Jampolis, P. LeMon Clark, III, and Victor R. Krueger. *J. Thorac. Surg.*, 1954, 27: 330.

This study was undertaken to examine the present and past experiences of the authors with resective treatment of pulmonary tuberculosis. Most of the operations were carried out within the past 2 years. There were 110 surgical resections on 98 patients, and the surgical procedures were carried out by seven different surgeons. Pneumonectomy was done in 20 cases, lobectomy or bilobectomy in 30, segmental resection in 44, local excisions or subsegmental resections in 10 cases, and combined segmental resections and subsegmental or local excisions in 6 cases. The patients were placed in various positions, such as the prone, lateral, supine, and semi-prone.

The results demonstrate that, in general, chemotherapy has produced a profound reduction in the risk associated with these operations. Also, the less tissue resected (which in most cases means less extensive disease), the lower will be the rate of complications and mortality. The complication rate seems to be lower among those patients operated upon in the prone position. The complications due to tuberculosis were much fewer among those patients whose sputum was negative to concentrate and culture prior to operation.

—Beatty H. Ramsay, M.D.

The Diagnosis and Therapy of Isolated Processes of the Middle Lobe (Zur Diagnosis und Therapie isolierter Mittellappenprozesse). M. Schwaiger. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 96.

Twelve instances of isolated involvement of the middle pulmonary lobe form the experimental material on which the considerations here expressed are based. Six of the patients were suffering from benign, that is, nonmalignant processes, and 6 had malignant tumor of the bronchus.

The most important consideration is, of course, the differential diagnosis. Characteristic of the nonmalignant processes (tuberculosis of the peribronchial lymph nodes, banal inflammatory or noninflammatory processes, mechanical blockages such as 1 instance of echinococcus cyst) is the tendency to contraction of the atelectatic middle lobe into a small flat or chunky remnant which is best filmed on lateral projection. The bronchus is cut off sharply; it is not funnel-shaped as is characteristic of carcinoma. Finally, there is a tendency for the condition to remain symptomatically latent for long periods of time, and to get better in many instances.

However, these characteristics, even when all are present, are not absolutely reliable in the differential diagnosis. The author presents 1 case history in which all these characteristics were present and yet biopsy proved the process to consist of flat-celled cancer with extensive metastases in the mediastinum and paratracheal lymph nodes.

The differential diagnoses with bronchoscopy and bronchoscopic biopsy is not always decisive and is frequently difficult of interpretation; therefore, the author believes that carcinoma cannot thus be excluded with certainty. He believes that the indications for thoracotomy and even lobectomy should be much more often considered than is generally conceded. The risk of such procedures is minimal when compared with the danger of overlooking a still operable carcinoma.

When cancer can be excluded with certainty, the indication for operation and resection of the middle lobe is present only when a suppurative bronchiectatic process, abscess formation, or recurrent pneumonia dominate the picture. In 1 of the author's patients such indication (bronchiectasis) was present, but operation was refused by the patient. An absolute indication is present in the instances of tuberculosis of the bronchus. Here, resection in bronchus intermedius or a bilobectomy must be resorted to in order that closure of the bronchial stump can be made in healthy tissues.

When the patient is admitted with the initial attack (pneumonia, pleuritis, severe bronchitis) the treatment will usually be conservative and the result of such treatment should be awaited before resection is done. In the absence of severe symptoms or in the presence of minimal subjective manifestations, removal of the shrunken and fibrotic middle lobe is not demanded immediately; the patient is apprised of his condition and advised to remain under medical supervision. —*John W. Brennan, M.D.*

Changes in the Lung After Bronchography with Contrast Media Containing Carboxymethyl Cellulose (Die Lungenveraenderungen nach Bronchographie mit carboxymethylcellulosehaltigen Kontrastmitteln). Robert Hess. *Thoraxchirurgie*, 1954, 1: 499.

The author, of the Pathology Department of the University of Basel, Switzerland, examined a series of 19 lungs of which bronchograms had been taken previously. The contrast material used had been Ioduron B in 18 cases and Umbradil B in 1 case. The time interval between the bronchography and the histological examination varied between 4 days and 4 years. The examined tissue specimens were surgical material in 16 cases and autopsy material in 3 cases.

Other investigators have shown that the iodine in the contrast materials is eliminated very rapidly by the kidneys so that as soon as one hour after bronchography no iodine can be demonstrated in the roentgenogram. This, however, is not the case for the carboxymethyl cellulose (CMC) which is used as the vehicle in these compounds.

The writer found remnants of CMC in the lung tissue in all 19 cases. The CMC, although presumably not toxic, acts as a foreign body in the alveoli and bronchioli and causes considerable fibrous reaction. During the first few days after bronchography, hyperemia and widening of the septa, emigration of the round cells and phagocytosis are observed. Around the sixth or seventh day typical foreign body granulomas develop which reach their maximum at the end of the first month. Thereafter, phagocytosis of the CMC increases, and the substance is eliminated via the lymph vessels. At a later stage, fibrous reaction in the area of the granuloma prevails. However, even years after the bronchography small masses of CMC appeared in the interstices of the fibrotic tissue.

The author states that his studies proved that CMC cannot be resorbed, and that the described reactions may be harmful, especially in a lung that has been damaged already by disease. Bronchography with water soluble material containing cellulose should, therefore, be used only upon strict indications and the instilled amount should be kept as low as feasible.
—*Werner M. Solmitz, M.D.*

Clinical Consideration of Abscesses and Cavities of the Lung. J. Burns Amberson. *Bull. Johns Hopkins Hosp.*, 1954, 94: 227.

This instructive article highlights the differences between two large groups of abscesses and cavities occurring in pulmonary tissues, viz., those caused by necrosing nontuberculous bacterial infections and those caused by the tubercle bacillus. Although the incidence of tuberculosis is greater than that of nontuberculous lesions the latter are therapeutically more manageable. A striking feature of the acute nontuberculous abscess is the rapidity with which necrosis goes on to liquefaction and sloughing. Considering that simple infarcts of the lung are caused usually by aseptic embolism it is noteworthy that (in spite of the necrosis of parenchymal tissue) few of these go on to abscess formation. Abscess is thought to be due to infection of the infarcted tissue with inhaled bacteria. The inflammation leading to an abscess usually results from some infection which has a peculiar capacity to cause tissue death. In the first phase of such an infection it may be difficult to differentiate it from a nonnecrosing inflammation; histologically they may be identical. If the disease is arrested at this point, complete resolution may follow. There is considerable evidence to indicate that the chief cause of the abscess lies in the kind of infecting organism. This is well exemplified in a putrid abscess with its usual foul odor. That such foulness cannot be attributed to the death of lung tissue alone is seen in the fact that abscesses due to Klebsiella pneumoniae do not cause a foul odor of the sputum in spite of extensive destruction. Secondary invasion does occur, but is not so important as has been claimed. When tuberculosis has caused scarring sufficient to interfere with bronchial drainage there may be a secondary infection with consequent foul expectoration. Most nontuberculous abscesses are due to infection by inhalation. This can be demonstrated in many ways, one of which is the fact that young children and edentulous patients do not often have the putrid abscess of the lung which can occur from foci about teeth harboring anaerobic and microaerophilic organisms.

It is interesting that abscesses due to inhalation are usually single. During their evolution, such abscesses

discharge great quantities of purulent material through the bronchial tree. That such material does not cause still other abscesses must be regarded as evidence that a high concentration of the infective material is a prerequisite to abscess formation. In contrast to this, the initial infection in tuberculosis is accomplished usually by a very low concentration of tubercle bacilli, but these are so pathogenic that they are capable of initiating an infection.

In the healing of pulmonary cavities, striking differences are observed between the tuberculous and nontuberculous types. The former show an imperfect kind of healing because of the durability of tubercle bacilli and the characteristically slow softening of the caseous focus. Likewise, free bronchial communication with the tuberculous cavity helps to perpetuate the infection rather than to clear it up, as in the case of nontuberculous ones. Again, in the instance of bleeding from disrupted vessels in the walls of the cavities, such an occurrence in a nontuberculous process produces, at worst, a bronchopneumonia which usually clears rather quickly. In a tuberculous situation this may be a catastrophic complication changing the chronic case into a rapidly fatal tuberculous pneumonia.

This article should be read in toto by those interested in lung pathology.

—*Benjamin F. Lounsbury, M.D.*

Roentgenologic Investigation of Bronchogenic Cysts; New Diagnostic Aids with Gaseous and Liquid Contrast Media (Le cisti broncogene all indagine radiologica nuovi sussidi diagnosticicon mezzi di contrasto gassosi e liquidi). P. Braggion and G. Polvar. *Chir. torac.*, 1954, 7: 118.

The histologic characteristics and the gross anatomical aspects of bronchogenic cysts are discussed. The problem of classification of these lesions, the distinction between bronchogenic cysts and cystic bronchiectasis, and the past and present views on the embryology are mentioned in the introductory section. The clinical symptomatology is briefly outlined and emphasis is placed on the vague presenting symptoms and on the atypical clinical picture of the cysts secondarily infected. The roentgenological aspect, the value and limitations of bronchography, and the questionable diagnostic significance of pneumoangiography and of pneumothorax are discussed.

Most of the article is devoted to the presentation of 6 cases of bronchogenic cysts, with emphasis on the value of pneumomediastinum in bronchogenic cysts adjacent to the mediastinum from the surgical point of view. The injection of air determines the presence or absence of adhesions of the cyst to the mediastinal structures and facilitates the surgical intervention itself. The ages of the patients in this series varied from 15 months to 47 years. Surgical excision was performed in all except the youngest patient. A detailed description of the roentgenologic findings is presented in each case. The pneumomediastinum was instituted prior to surgery by the peridural injection of oxygen in 3 of the 6 cases. The amount of oxygen varied from 600 to 1,500 c.c.

The final section of the article is devoted to the problem of differential diagnosis and the value of pneumomediastinum in the diagnosis and the surgical evaluation of bronchogenic cysts. The authors consider the procedure of value and of reasonable safety.

—*Roger H. L. Wilson, M.D.*

Modern Treatment of Bronchial Adenoma (Moderni orientamenti nel trattamento chirurgico dell'adenoma bronchiale). Dante Manfredi. *Gior. ital. chir.*, 1954, 31: 124.

The author reports on 2 cases of bronchial adenoma observed at the University of Rome Clinics. In both cases pneumonectomy was performed.

The literature is reviewed and the author concludes that conservative management should be practiced when possible. The 2 cases reported were not suitable for local excision or lobe resection.

The following schematic form of therapy is recommended:

1. When there are signs of malignancy a wide resection as for cancer should be done,
2. If the distal pulmonary tissue is involved by pathological changes more or less permanent, pulmonary resection is to be undertaken,
3. If the pulmonary tissue is normal, bronchotomy with local excision is in order, and
4. If the patient is very old or if he should be in poor general condition, conservative endoscopic treatment is advised and surgical treatment is done later if it is deemed advisable.—*Lucian J. Fronduti, M.D.*

Diagnostic Errors in Bronchial Carcinoma, and a Contribution to the Symptomatology and Pathology of Gumma of the Lung (Diagnostische Irrtuemer beim Bronchialcarcinom, zugleich ein Beitrag zur Klinik und Pathologie des Lungengummas). Gerhard Hartmann and Eberhard Schaudig. *Thoraxchirurgie*, 1954, 1: 531.

The authors, of the Surgical Department of the University of Jena, Germany, discuss the difficulties of diagnosis in suspected bronchial carcinoma. Even with the help of bronchoscopy, biopsies, and cytologic examinations, errors are possible. They report on 2 pertinent cases in which resection could have been avoided if it had been possible to establish the correct diagnosis before the operation.

In the first case the diagnosis was made on the basis of roentgenography, bronchoscopy, and biopsy. The examination of the "tumor" revealed an aspirated fragment of chicken bone in the wall of the inferior lobe bronchus. An unspecific chronic inflammation had developed around this foreign body.

In the other case the clinical symptoms were cough and hoarseness. X-rays revealed a round tumor in the periphery of the inferior lobe. The extirpated mass of hen's egg size was a gumma of the lung. The patient's serology was negative. —*Werner M. Solmitz, M.D.*

Primary Lymphosarcoma of the Lung; a Report of 2 Cases. Orville F. Grimes, William Weirich, and H. Brodie Stephens. *J. Thorac. Surg.*, 1954, 27: 378.

Very few reports of primary lymphosarcoma in which the lung was the site of origin have appeared in the literature. In two large series of malignant lymphomas reviewed about a decade ago, only 1 case (in a total of 814) was considered to have arisen from the pulmonary parenchyma. Since that time, 7 other cases

have been recorded. (Beck and Reganis supplement their case report with data concerning 8 additional cases treated but not reported by other surgeons.)

At the University of California Hospital, 2 patients with primary lymphosarcoma of the lung were operated upon in the past 22 years. A discussion of these 2 cases is presented for analysis of the diagnostic and therapeutic characteristics.

Of the 2 patients observed at the University of California Hospital, both had symptoms referable to the respiratory system. In 1 case, as in 4 of the cases previously reported, the patient sought medical consultation which led to diagnosis of the complaint. In the other case, as in 3 of those previously reported, the lesion was first demonstrated by a routine chest survey film. Both of the patients were women, as have been a preponderant number of those previously observed. They were 68 and 45 years of age, respectively. The age range in the cases previously reported was from 34 to 68 years, with an average age of 46 years.

As would be expected, cytologic studies were negative in both of the cases. This was probably due to the fact that lymphosarcomas do not tend to exfoliate cells as do bronchiogenic carcinomas. Even when lymphosarcoma is suspected, however, cytologic examination should be performed, since the diagnosis is only presumptive until the tumor is examined at operation and in the pathologic laboratory.

It is the authors' opinion that wide excision by pneumonectomy accompanied by mediastinal lymph node dissection is the treatment of choice for primary lymphosarcoma of the lung. The use of postoperative irradiation therapy to the mediastinal lymph node-bearing area must be considered since lesions of this type respond favorably to x-ray therapy.

The prognosis appears to be significantly more favorable in patients with primary lymphosarcoma of the lung than in patients having bronchiogenic carcinoma.

The case histories of 2 patients with primary lymphosarcoma of the lung are presented. Although the period of follow-up is not yet sufficient for incontrovertible evaluation, it appears that primary lymphosarcoma of the lung can be treated effectively by either extensive surgery alone, or with postoperative x-ray therapy. —*Beatty H. Ramsay, M.D.*

HEART AND PERICARDIUM

Some Aspects of Mitral Disease in Relation to Surgical Treatment. D. M. Douglas and Ian G. W. Hill. *Edinburgh M. J.*, 1954, 61: 133.

Among 64 patients who had undergone surgical treatment for mitral disease, 33 were followed for 6 months and 18 for over a year; 70 per cent of these patients derived significant benefit. The result in the stenotic patients was better than in those with incompetent valves; 80 per cent of patients with stenosis showed significant benefit, while only 50 per cent of those with incompetent mitral valves had good results. The improvement in the patients with regurgitation was thought by the authors to be due in part to psychological effects. The authors were perplexed by the improvement in many of these patients with regurgitation. Since there is this unexplained improvement in these patients with disease of the mitral valve, it would be difficult to assess the results of any operation specifically designed to correct regurgitation, since simple valvotomy gives good results in half the cases.

From the surgical viewpoint, and from the behavior of inflammatory strictures in other viscera, one would suppose that a considerable proportion of patients would show temporary relief only, and that after some years a gradual recurrence of the symptoms may appear. However, if even as little as 5 years of comfort in the miserable existence of a patient with mitral stenosis are achieved, the operation is well worth while. —*John E. Karabin, M.D.*

A New Operation for Mitral Regurgitation. John Hayward. *Austral. N. Zealand J. Surg.*, 1954, 23: 257.

The author describes a new operation in which he invaginates the auricular appendage as a living pedicled graft with its blood supply intact, for the care of mitral regurgitation. The auricular appendage is inverted and fixed with sutures to the left ventricle. The operation leaves nothing but living endocardium in contact with the cardiac blood. The risk of postoperative intracardiac thrombosis should be minimal. It is unlikely that the appendage will ever fit the regurgitant space exactly so that some regurgitation will always remain.

The author has operated upon 2 patients, both of whom had an immediate excellent result; however, there is an addendum to the article in which he relates that 9 weeks after surgery in one case, and 12 weeks after surgery in the second case, the patients deteriorated to a condition similar to, or perhaps slightly worse than, the original condition. As both patients are living he cannot check at autopsy whether the auricular appendage has failed to remain fixed. The author reports with a knowledge that the cases were failures but hopes the idea yet may be a small stepping stone on the difficult path to successful surgery for mitral regurgitation. —*Edmund R. Donoghue, M.D.*

Medical Aspects of Patients Undergoing Surgery for Mitral Stenosis. Lewis Dexter, Lawson McDonald, Murray Rabinowitz, George A. Saxton, Jr., and Florence W. Haynes. *Circulation*, 1954, 9: 758.

The authors and their colleagues have supervised the selection and medical management of approximately 600 patients undergoing surgery for mitral valve disease in the last 4 years. The report embodies the experience gained.

A discussion of the pathologic physiology of mitral stenosis points out that the normal valve is pliable and has an orifice of 4 to 6 sq. cm., and at rest about 6 liters of blood pass through it per minute during diastole. The normal pressure gradient between the left auricle and ventricle is only 1 or 2 mm. Hg during diastole. As the valve becomes stenotic, the pressure in the auricle must rise to maintain the normal flow. This is associated with increased pressure in the pulmonary veins and capillaries. Pulmonary capillary pressure cannot long exceed the osmotic pressure of the plasma without the transudation of fluid and the occurrence of pulmonary edema. The critical upper limit of pulmonary capillary pressure has been found to be 30 mm. Hg. The cardiac output falls concomitantly with mitral stenosis, and so the pulmonary

capillary pressure is thus enabled to remain at subcritical levels in the presence of an extremely small valve. When the mitral valve approaches 1.0 sq. cm. in size, there is an increase in the resistance to the flow of blood through the precapillary vessels in the lungs. The origin of this may be functional or organic because of intimal proliferation and medial hypertrophy of the small vessels. Both factors may be present. There is great individual variation in the severity and rapidity of onset of this vascular change. It is this change which may cause right ventricular hypertrophy and dilatation, but it also permits the pulmonary capillary pressure to rise to 35 mm. Hg without the occurrence of edema.

The clinical manifestations of mitral stenosis vary with the degree of narrowing of the mitral valve and with the severity of the complicating pulmonary resistance. At a valve size of 2 sq. cm., the pulmonary pressure is little elevated at rest, although it may rise with vigorous exercise. Mild dyspnea on exertion does not usually appear until the valve is about 1.5 sq. cm. At a valve area of 1.0 sq. cm. the resting pressure in the pulmonary capillaries is usually about 20 mm. Hg, and this quickly rises to pulmonary edema levels with the slightest exertion.

In the opinion of the authors there are four clinically definable syndromes, representing different stages of the disease, in the natural history of mitral stenosis. The classification of patients according to these syndromes has been found to be advantageous, although often the individual patient will be found to be in some intermediate stage.

Stage 1. No increased pulmonary vascular resistance and subcritical narrowing of the valve (orifice greater than 1.2 sq. cm.).

Stage 2. Little or no increase of pulmonary vascular resistance and critical narrowing of the mitral valve (less than 1.2 sq. cm.).

Stage 3. Moderate increase of pulmonary vascular resistance (6 to 10 times normal) and further narrowing of the mitral valve (1.0 sq. cm. or less).

Stage 4. Severe degree of pulmonary vascular resistance (more than 10 times normal) and severe narrowing of the mitral valve (0.8 sq. cm. or less).

As the patients progress through stage 1, breathlessness and exertional dyspnea increase, and activities are gradually decreased. The left auricle may be enlarged, but electrocardiographic and radiologic evidence of right ventricular hypertrophy are absent.

In stage 2, the patients may be comfortable at rest, but severe pulmonary symptoms appear with mild exertion, emotion, or tachycardia. The patient cannot climb more than a flight of stairs. Orthopnea, paroxysmal nocturnal dyspnea, acute pulmonary edema, and hemoptyses occur. This is the "tight mitral stenosis" with the normal-sized heart. Electrocardiographic and roentgenologic evidence of right ventricular enlargement may or may not be present.

In stage 3, although the patient may or may not have passed through the clinical syndromes above, the electrocardiogram practically always shows right ventricular hypertrophy. Roentgenologically, there is enlargement of the left auricle, right ventricle, and pulmonary artery. Generalized cardiac enlargement of more than 20 per cent is almost always present.

In stage 4, the patients are on the verge of pulmonary edema at all times, and are completely incapacitated physically.

In the majority of cases, surgery can enlarge the valves from 1.5 to 2 sq. cm. or more. Over a course of 6 to 8 months, the increased pulmonary resistance returns to normal or nearly normal.

In stages 2 and 3, the risk of surgery involved a mortality of about 3 per cent in the hands of D. E. Harken. In stage 4, the mortality was 23 per cent.

The authors believe that the indication for surgery is the presence of the clinical syndromes described in stages 2, 3, and 4. In addition, the occurrence of arterial embolism is regarded as an indication for surgery.

In the majority of patients under the age of 20, disability stems from active rheumatic carditis, and not from a critically narrowed mitral valve. Surgery is generally withheld from these patients unless a narrow valve is definitely present. Surgery has been performed on a number of patients over age 50 (the oldest was 69) and, in general, these patients do well.

It is not considered to be in the patient's interest to operate during stage 1. Surgery has not been withheld in any patient because of the severity of the mitral stenosis.

The problem of multivalvular lesions is discussed, and differential diagnostic points are given. Surgery is not advised if aortic stenosis or regurgitation are present in significant degree. In regard to the problem of mitral stenosis versus mitral regurgitation, it is pointed out that one or the other has to predominate in order to maintain a cardiac output. Means of clinical differentiation are given. Surgery usually benefits patients having pulmonic regurgitation, tricuspid stenosis, and tricuspid atresia. It is necessary to correct tricuspid stenosis surgically, after operating on the mitral valve.

Rheumatic activity is not considered by the authors to contraindicate surgery provided the valve orifice is already severely stenosed and the operation is urgently indicated. It is assumed that the patient will be better able to withstand the added burden of activity if the valve is widened. However, surgery has not been performed in cases with florid rheumatic activity.

Subacute bacterial endocarditis is an absolute contraindication to surgery. It has been customary to operate after 6 weeks of medical treatment if operation is urgent.

If surgery was indicated prior to an episode of pulmonary infarction, surgery is usually undertaken after 2 weeks of anticoagulant therapy.

Auricular fibrillation has not been found to introduce any additional hazard to surgery except that it predisposes to left auricular thrombosis. An advantage is that the pulse rate is more easily controlled with digitalis in these cases than in those with normal sinus rhythm.

Calcification of the mitral valve is not a contraindication to surgery, although there is occasional difficulty in maintaining patency of the orifice despite good anatomic fracture of the commissures.

Preoperatively, all patients are placed on a low salt diet (200 mgm. per day). All patients are digitalized

so that postoperative arrhythmias can be easily controlled with intravenous digoxin. Mercurial diuretics are not given during the 48 hours preceding surgery. Quinidine and pronestyl are given only during operation in the treatment of ventricular ectopic beats or ventricular tachycardia. Cortisone and ACTH are not used preoperatively.

An electrocardiogram recording is run during the operative procedure. However, the heart may contract poorly despite a normal recording. For poor contractility, the drugs of choice are calcium chloride and epinephrine, for auricular arrhythmias prostigmine is used, and for ventricular irritability pronestyl is given.

Postoperatively, digitalization and low sodium intake are maintained. In the patients with a normal sinus rhythm, quinidine (0.3 gm. every 6 hours by mouth) is begun with the object of preventing auricular fibrillation. In the patients who develop auricular fibrillation and who do not spontaneously revert to a normal rhythm, an attempt is made on the tenth to fourteenth day to convert them with quinidine. After reversion, patients are maintained on quinidine, 0.3 gm. four times a day for a month or 6 weeks. Diuretics are seldom indicated in the postoperative period. Daily fluid and electrolyte replacement equals 2 gm. per day in 1,500 to 1,800 c.c. of water, plus an amount of salt and water equal to that lost by chest drainage.

The operation does not confer immunity to a recurrence of rheumatic activity, and a stormy postoperative course may be evidence of it. All patients should have permanent prophylactic treatment with antibiotics after operation. —*Robert D. Keagy, M.D.*

Successful Mitral Commissurotomy During Pregnancy (Commissurotomie mitrale pergravidique avec présentation d'un cas couronné de succès). René A. Mingeot. *Bruxelles méd.*, 1954, 34: 1021.

A 29 year old primipara 5 months pregnant was admitted to the hospital because of excessive fatigue, palpitation, vertigo, and dyspnea of 1 year's duration, and orthopnea, weight loss, and paroxysmal nocturnal dyspnea of 9 months' duration. Essential physical and laboratory findings were an enlarged heart with mitral configuration on the roentgenogram. There was a loud first sound and a mid-diastolic murmur on auscultation. The red blood count was 3.1 million and the electrocardiogram showed right axis deviation. At operation the left auricle was greatly dilated. The mitral valve would not admit the tip of the finger. A finger fracture commissurotomy was done. The patient left the hospital on the seventeenth postoperative day and delivered a normal infant 4 months later. A follow-up examination 8 months after the commissurotomy showed that the heart had decreased somewhat in size. Only minimal symptoms were present at this time, and the patient's condition was much improved compared to her preoperative status.

In the literature there are 6 cases of mitral commissurotomy accomplished during pregnancy, in addition to the author's case. One of these was done in the ninth month of pregnancy, 2 days before delivery. The outcome was successful for both the mother and infant. —*Frederick W. Preston, M.D.*

The Effect of Artificial Hibernation upon Myocardial Lesions Experimentally Produced by Ligating a Coronary Artery (Sulla azione della ibernazione artificiale nelle lesioni miocardiche sperimentali secondarie alla legatura di una arteria coronaria). E. De Cesare and G. Ricci. *Ann. ital. chir.*, 1954, 31: 1.

The authors used dogs weighing from 12 to 15 kgm. A control group of 6 dogs was first used. The coronary artery was ligated at various intervals under anesthesia. The longest survival was 3 days, and 3 of the dogs died within the first 2 to 3 hours.

In the second group there were 10 dogs. The anterior descending coronary artery was ligated at its origin in 5 of the animals and at its middle in the other 5. The dogs were kept under artificial hibernation with anesthesia and ice bags.

In the dogs in which the vessel was ligated at its origin there was no beneficial effect from the hibernation. There were some benefits, however, in the dogs in which the artery was tied at its middle. Two dogs survived 5 and 6 days, respectively. At autopsy no infarcts were seen in either case.

The application of artificial hibernation to human beings with myocardial infarcts is proposed as a procedure for study and the authors believe that it merits further investigation. —*Lucian J. Fronduti, M.D.*

A New Method of Extracorporeal Circulation. Deep Hypothermia Combined with Artificial Circulation. Andre A. Juvenelle, John Lind, and Carl Wegelius. *Am. Heart J.*, 1954, 47: 692.

The authors are convinced, from the work of others reported in the literature and studies previously undertaken by them, that if it were possible to overcome "cold ventricular fibrillation," hypothermia could be used safely as a therapeutic agent and as an aid in many surgical problems.

These investigators believe that the gross biochemical changes in progress during refrigeration are reversible and comparable largely to those observed in the hibernating animal. Since their previous studies disclosed no definitely harmful effects of hypothermia, they studied the effect of extracorporeal circulation combined with hypothermia.

The purpose of the investigation was an attempt to develop a safe method of cooling and rewarming, and physiological information regarding cooling, rewarming, and ventricular fibrillation. They hoped that these studies would contribute to a safe method for use during intracardiac surgery.

Forty-four mongrel dogs were used for the experiments. The type of anesthesia, the preliminary surgery for perfusion, the establishment of clotting and other controls, and the method of refrigeration and perfusion are described.

These experiments apparently show that the results presented here are no better than those offered by any conventional method of perfusion. The authors are confident of the future of hypothermia combined with perfusion in cardiac surgery.

The disadvantages and inconveniences of reduction in body temperature to the necessary low levels and its duration to be effective are considered. It is possible in dogs to lower the body temperature to levels

ranging from 12 to 16 degrees C., to replace the circulation by a simple perfusion method described during ventricular fibrillation exceeding 3 hours, to control this fibrillation through the unopened chest, and to have the dog return to life.

It is possible to use the same technique for intracardiac surgery within desirable limits in animals, but further developments are required before its application to human problems would be beneficial or safe.

—*John H. Mohardt, M.D.*

The Surgical Revascularization of the Myocardium (La rivascolarizzazione chirurgica del miocardio). G. Ricci and E. De Cesare. *Gior. ital. chir.*, 1954, 31: 105.

The authors summarize briefly the principal methods of revascularization of the myocardium. They review the most impressive ones appearing in the American and European literature in recent years and some of the pioneer work of the middle twenties and thirties.

A brief review of the modern concepts of the coronary blood supply precedes the presentation of the methods of revascularization attempted so far.

—*Roger H. L. Wilson, M.D.*

Massive Hemorrhage Combined with Controlled General Hypothermia and Its Application in Experimental Cardiac Surgery (La sottrazione rapida e massiva del sangue nel corso della ipotermia generale controllata e le sue applicazioni nella chirurgia cardiaca sperimentale). Antonio Bobbio, Piero Goffrini, and Eugenio Bezzi. *Bol. Soc. piemont. chir.*, 1954, 24: 428.

It has been demonstrated that when an animal, at normal body temperature, is rapidly bled spontaneously from two medium-sized arteries to the point of exsanguination, the animal will die if the blood is not immediately reinfused within 3 minutes. The immediate compensatory mechanism in such animals is accompanied by a general vasoconstriction, depletion of the blood pools (splenic contracture), tachycardia, and tachypnea. At autopsy, these animals were found to have an intense venous congestion of the viscera, which is characteristic of irreversible shock.

These vasomotor changes can be inhibited by artificial hypothermia. Following basal narcosis, the animal is cooled in ice and the body temperature is reduced from 37.5 to 28 degrees C. Under these conditions, the period of rapid exsanguination can be prolonged from 5 to 25 minutes before the stage of irreversibility is reached. The amount of blood that is removed from these animals averages about 67 per cent of the total blood volume. Tachycardia and tachypnea are not observed, but at autopsy it was demonstrated that the cardiac chambers were devoid of blood and the viscera were ischemic Thus, these animals did not enter into the irreversible phase of hemorrhagic shock as seen in the normothermic animals.

The majority of the hypothermic animals were kept at the phase of exsanguination for 15 minutes and following arterial reinfusion of the bled volume the blood pressure and cardiac rate returned to normal and no permanent sequelae were observed. Electroencephalographic tracings during this period showed a general slowing and flattening of electrical activity which returned to normal on reinfusion.

This procedure was then used to explore the left heart in 8 animals. The thoracotomy was carried out under general anesthesia. When the heart was exposed, rapid exsanguination was done via the femoral arteries. The blood was collected in heparinized containers which allowed adequate oxygenation. The ischemic left chambers of the heart were then opened and explored for 3 to 5 minutes, and then sutured. The bled volume was then reinfused arterially. Four animals in this group survived without sequelae.

The authors are of the opinion that this method has important clinical applications in rapid cardiac procedures such as mitral commissurotomy and anastomosis of the great vessels about the heart.

—*Roland A. Manfredi, M.D.*

Aortic Stenosis; Diagnosis and Treatment. Andrew Logan and Richard Turner. *Lancet*, Lond., 1954, 1: 1091.

The authors present several operative cases to prove the efficacy of aortic valvulotomy. Their experience has been encouraging. The prognosis in aortic stenosis, once symptoms are manifest, is poor. Because of left ventricular hypertrophy, patients may be asymptomatic for years. Medical therapy is of little value when cardiac failure has supervened. Restriction of physical activity does little to stem the progress of the disease. The main symptoms are shortness of breath on exertion, syncope, and angina pectoris.

Shortness of breath is due to pulmonary edema. The aortic stenosis prevents decompression of the pulmonary circulation. Paroxysmal dyspnea is a manifestation of momentary inability of the left ventricular musculature to move the blood. Nocturnal dyspnea is attributed to increased venous return to the right heart and absorption of edema fluid. Angina is the result of coronary insufficiency secondary to decreased cardiac output. The presence of coronary atheromata is not constant. Angina may be associated with tachycardia; syncope is most likely to result from cerebral anoxia secondary to reduced cardiac output. Sudden death may occur in patients with aortic stenosis.

Left ventricular hypertrophy is a fairly constant finding with the apical impulse displaced to the left. An aortic systolic thrill is usually palpable, especially if the patient is sitting up; there may also be a transmitted carotid thrill. A pulse of small volume may be present. The concomitance of aortic regurgitation may nullify this finding. Murmurs are found to the right of the upper sternum; these are harsh and systolic in time. If aortic regurgitation is present there may be an early diastolic murmur. The systolic blood pressure may be reduced. There is frequently roentgenologic evidence of left ventricular hypertrophy, and calcification in the valve leaflets can be demonstrated. The electrocardiogram shows signs of progressive left ventricular hypertrophy.

The operation by these authors is performed with the patient in the right lateral position. The surface of the heart is examined for thrills and calcification. The left ventricle is incised close to the septum and a sound is introduced into the chamber to feel the aortic valve. After withdrawing the sound a dilator is introduced

and expanded in several planes. Since calcareous deposits may be detached from the valve during this maneuver, the carotids are momentarily occluded.

Case I is that of a man aged 54, in fair condition, with a harsh systolic murmur, a systolic blood pressure of 95, and an early diastolic murmur. Radioscopic examination revealed calcification of the cusps and left ventricular enlargement. At operation a calcified valve was found and ruptured. One year after operation the symptoms which prompted him to seek attention had disappeared. The authors operated upon a total of 9 patients, with one death. Because of simultaneous aortic and mitral stenosis in several cases, it was necessary to accomplish fracture of both valves; in these patients the outcome was satisfactory.

The authors note that aortic valvulotomy is palliative and that there are definite operative risks. The results thus far justify the procedure. Operation should be advised before cardiac failure supervenes.

—*Richard L. Lawton, M.D.*

Surgical Correction of Aortic Insufficiency. CHARLES A. HUFNAGEL, W. PROCTOR HARVEY, PIERRE J. RABIL, and THOMAS F. MCDERMOTT. *Surgery*, 1954, 35: 673.

THE treatment of aortic insufficiency has always offered a serious problem once the signs of failure have appeared. Like many of the other acquired valvular diseases, the onset of failure is to a large measure the end result of the mechanical defect, which after a prolonged period of time imposes an insurmountable strain upon the myocardium. This, in effect, is a reflection of the excessive work load imposed by insufficiency. A reduction or complete correction of the valvular defect would, therefore, offer hope for patients incapacitated by this condition. If instituted early, such correction of the valvular defect might prevent the changes described and enable them to be reversed.

The surgical treatment of aortic insufficiency has been extensively investigated in experimental animals. While many of these experiments have shown early promise, the late results have not appeared to be sufficiently effective for application to the human being. In most instances a homologous transplant of either the aortic or the pulmonary valve as a unit was attempted. Other methods have been devised to reconstruct a valve with segments of pericardium, veins, arteries, or a combination of these structures. The late results with these methods have been inadequate. The authors describe another technique pursued since 1946.

In 1954, an investigation of the practicability of replacement of major portions of the arterial tree with plastic materials was begun, and it was established that major portions of the aorta could be successfully replaced by properly designed tubes of methylmethacrylate. An outgrowth of this investigation was the development of a multiple-point fixation ring for substitution of the aortic valve that fulfilled the necessary requirements and prevented necrosis. The details of manufacture and technique of application are presented in detail.

Since September, 1952, 23 patients have had this type of surgical treatment for aortic insufficiency, with the currently acceptable valve and multiple-point fixation. Most of the patients were in the terminal stages of their disease and showed signs of cardiac failure with diastolic gallop rhythms and Austin Flint murmurs associated with severe aortic insufficiency, enlargement of the heart, and wide pulse pressures.

In the majority of cases comprising this series the aortic insufficiency was of rheumatic origin. Syphilitic disease was held to be responsible in 20 per cent and arterial atherosclerotic disease in the remainder.

Seventeen patients are now living and relieved of their symptoms following the insertion of an aortic valvular prosthesis. The duration of the observations has been up to 11 months and their conditions are improved greatly by subjective and objective criteria.

Currently, other types of prostheses and the best site for insertion are being investigated. This group of patients represents the first attempt at surgical correction of aortic insufficiency by this technique in human patients and the results are extremely encouraging at this time.

—*John H. Mohardt, M.D.*

Mediastinopericarditis Externa Caused by Paraffin; Paraffinosis of the Mediastinum. (Mediastino-Pericarditis externa, verursacht durch Paraffin; Paraffinose des Mediastinums). R. NISSEN and O. HASE. *Thoraxchirurgie*, 1954, 1: 480.

THE authors, of the Surgical Department of the University of Basel, Switzerland, report an interesting case of paraffinosis of the mediastinum.

A man 31 years of age had suffered from lung tuberculosis for 8 years. Because of a large cavity in the left superior lobe an extrapleural pneumolysis was performed and the wound cavity was filled with liquid petrolatum. For 2 years after the operation the patient was well and able to work. Three years after the intervention increasing dyspnea and cough developed. At the time of admission severe dyspnea, orthopnea, cyanosis, edemas of the legs, caput Medusae, enlargement of the liver, and highly elevated venous pressure were present. The patient was completely incapacitated and was able to sleep only in the sitting position. The roentgenogram showed widening of the mediastinal shadow and of both hili.

The operation revealed a large fibrous tissue mass of bone-hard consistency surrounding the pericardium like armor; its thickness was about 1 cm. This was excised, and the patient made an uneventful recovery. A year after the operation all clinical symptoms and signs had disappeared. Histologically, the excised tissue showed paraffine droplets in abundant amount in the interstices between the fibrous tissue fibers.

—*Werner M. Solmitz, M.D.*

Diverticulum of the Pericardium and Pericardiocelomic Cysts—Surgical Treatment (Diverticulo de pericardio y quistes pericardiocelomicos—tratamiento quirurgico). MARIO M. BREA and VICENTE N. ROGER. *Rev. As. med. argent.*, 1954, 68: 1.

THE pericardiocelomic cysts which are called simple, serous hygromas, spring water cysts, thin-walled cysts, or mesothelial cysts, by different authors, are characterized by having their origin in the anterior mediastinum in contact with the pericardium to which they adhere in the majority of cases; by having delicate thin walls of uniform thickness, lined by endo-

thelium and mesothelium; by having a clear, yellow, transparent, liquid content; and, lastly, by not presenting any specific symptomatology.

In general, pericardiocelomic cysts have no clinical manifestations. When symptoms occur they are not specific; there may be epigastric fullness, thoracic pain, cough, dyspnea, or tachycardia.

Roentgenologically they are visualized in the anterior mediastinum in the proximity of the pericardium. The borders are round and well defined, and the mass is moderately dense. They are usually fused with the cardiac shadow, which can be displaced or rotated.

Other diagnostic procedures, such as bronchoscopy, bronchograms, sputum examinations, and tomography, will not help in the diagnosis. The authors believe that exploratory thoracotomy in these cases will establish the correct diagnosis and removal of the cyst is the proper treatment.

The authors present the cases of 5 patients, 4 males and 1 female, but state that other statistics reveal an equal sex incidence. Their youngest patient was 22 years old and the oldest 62. Three cysts were located on the right side and 2 on the left.

One of their patients had a cyst that occupied two-thirds of a hemithorax, but usually the cysts are not so large

A definite diagnosis prior to thoracotomy is almost impossible. However, the authors believe that a tentative diagnosis can be approached by eliminating other pathologic conditions of similar localization and with equally nonspecific symptomatology, such as parasitic cysts, bronchogenic cysts, teratodermoids, diaphragmatic hernias, and ventricular aneurysms. The differential diagnosis between these conditions and pericardiocelomic cysts is given by the authors.

Thoracoscopy and diagnostic puncture of these cysts are looked on with disfavor by the authors since the data that these procedures give do not justify the risks. Exploratory thoracotomy is the best method of obtaining a definite diagnosis and no complication or surgical mortality was reported when it was done for a pericardiocelomic cyst. —*J. D. Ibarra, Jr., M.D.*

ESOPHAGUS AND MEDIASTINUM

Diverticula of the Esophagus; a Study of 17 Cases. L. Johansson and P. Michas. *J. Thorac. Surg.*, 1954, 27: 361.

Esophageal diverticulum has been recognized as a clinical entity since the end of the eighteenth century. Therefore, the more easily accessible extrathoracic esophageal diverticula were surgically treated for many years before sufficient experience with intrathoracic surgery was gained to permit treatment of diverticula of the thoracic esophagus. Now various surgical procedures are generally accepted as appropriate treatment for these distressing anomalies.

According to their location, diverticula of the esophagus may be classed as: (1) extrathoracic (pharyngoesophageal, cervical), or (2) intrathoracic. The latter may be subdivided into: (a) diverticula of the upper esophagus (epibronchial), and (b) diverticula affecting the lower esophagus (epiphrenic). The extrathoracic types, according to Magendie, compose 90 per cent of all esophageal diverticula.

Apart from the rare congenital cases, extrathoracic diverticula are seen almost exclusively in subjects more than 50 years of age. It has been presumed that these common esophageal defects are produced by mucosal herniation of the posterior portion of the pharyngoesophageal junction and from the anatomic point of view are really pharyngeal defects.

Various opinions have been expressed concerning their causal mechanism. According to Moynihan, vessels and nerves traverse the lower part of the constrictor musculature of the pharynx, and thus muscle-free spaces with lessened stress resistance arise. Pressure changes in deglutition may then cause the mucosa to protrude through these spaces. In several autopsy studies Cortesi observed that one-third of the subjects of all ages showed poorly developed constrictor musculature. He suggested that when the changes caused by aging are added to this constitutional weakness it might explain why extrathoracic esophageal diverticula are more common in later life. Rakitova (cited by Magendie) considered that ossification of the cricoid cartilage pressed the esophagus against the vertebral column. This little-accepted opinion might also explain the frequency of diverticula in older individuals, in whom the pressure of the hard cartilage could produce degeneration of the aging muscle. Holmgren's observation of roentgenographically visible, inconstant diverticulumlike changes in the border zone between the pharynx and the esophagus is interesting. Holmgren expressed the opinion that these changes were referable to anatomic conditions in the affected zone and pressure changes in and around the pharynx occasioned by deglutition. These changes might, he thought, be precursors of diverticula at this junction, despite the fact that no observations are recorded of such a preliminary stage in pharyngeal diverticula.

Even though the primary cause of extrathoracic esophageal diverticula is uncertain, it is known that the diverticula are progressively enlarged by repeated distention with swallowed food, so that in time the esophagus is obstructed and a vicious circle is established which can be broken only by extirpation of the defect.

The pouch may vary in size from a few cubic centimeters to the size of a clenched fist. Its wall consists only of a mucous and a submucous layer. In the rare congenital cases, however, a muscular layer is also present.

Mechanical and chemical irritation produced by distention of the sac and decomposition of the retained food give rise to a local esophagitis which, in rare instances, may result in perforation. Malignant degeneration may occur from chronic irritation.

The most important complications, however, are bronchopulmonary. A diverticulum which has filled during the day may, when the patient is asleep or otherwise in the supine posture, or when the pharyngeal reflexes are weakened, spill its contents into the air passages and give rise to aspiration pneumonia, lung abscesses, or bronchiectasis. The traumatic complications of esophagoscopy must also be listed as complications of esophageal diverticula.

Surgical treatment is the therapy of choice, and the authors recommend one-stage excision. Prior to surgery, the site should be washed out after meals and

antimicrobial agents should be given. The diverticulum should be removed in a single stage, and endotracheal, general anesthesia is now preferred. The authors have had no surgical fatality. They have had one paralysis of the recurrent laryngeal nerve, and one suture insufficiency which caused a fistula to appear on the fourteenth postoperative day. During repair of this fistula, the recurrent nerve was injured and persistent paralysis resulted. It is stressed that the smallest spur left behind provides conditions for regrowth, since surgery does not eradicate the etiologic factors.

Diverticula of the thoracic portion of the esophagus are relatively rare. According to Magendie, they comprise 10 per cent of all esophageal diverticula.

Epibronchial diverticula are the least common of the intrathoracic diverticula. They are found chiefly in the region of the tracheal bifurcation. Divergent theories have been advanced to explain their etiology. One of the earliest published theories was that of Kragh who, from autopsy observations, considered that the defect was produced by adhesion of the esophagus to a tuberculous lymph node which, when healing by scar retraction, exerted a pull on the esophagus and gave rise to a "traction diverticulum." Kragh also stated that the tuberculous node could perforate into the esophagus with epithelization of the abscess cavity from the esophageal mucosa. Kragh's view was to some extent contradicted by Ribert (cited by Perrotin), who pointed out that since tuberculous lymphadenitis was most common in childhood, more traction diverticula would be seen in children than in adults.

Whatever the actual causal mechanism, a pulsation factor is added by the swallowed food. A congenital defect, in which secondary infection produces adhesion to the adjacent structures cannot, of course, be excluded. Contrasted against congenital causes, there is the fact that symptoms generally do not appear until fairly late in life, but it is known that esophageal diverticula may be silent for many years. No doubt, each theory contains some truth, and it is probable that several etiological factors operate together. Pathologic and histologic study do not solve the problem.

It is not clear whether or not silent diverticula should be excised, but when a fistula has formed, surgical intervention is clearly indicated. In this latter instance, lobectomy or segmental resection of the lung are often necessary because the fistula is frequently between the esophagus and the bronchial tree.

Epiphrenic diverticula, as their name implies, are located in the lower portion of the esophagus, just above the diaphragm. They would appear, from the literature, to be the most common of the intrathoracic diverticula, although up to May of 1951, only 126 cases had been reported (Goodman and Parnes).

Pulsation is the causal factor, but why pulsation should produce a diverticulum at this particular point is not quite clear. Congenital weakness of the esophageal wall, localized esophagitis, and disturbance of the neuromuscular function in the esophagus have been suggested as the reasons. According to Goodman and Parnes, about 65 per cent of all epiphrenic diverticula are associated with cardiospasm.

Unless the diverticula are small, accidentally discovered, and symptomless, surgical intervention should be undertaken, but even such silent diverticula are likely to require operation at a later date. The weak point in the esophageal wall remains and the contributory pressure factor within the lumen will enlarge a small sac until symptoms necessitate operation. The risk of malignant degeneration also remains until the diverticulum is excised. Antispasmodics and local palliative therapy have their place as preliminary measures for surgery.

The various operative procedures which have been recommended for the treatment of epiphrenic diverticula are listed. No specific recommendation is made by the authors. —*Beatty H. Ramsay, M.D.*

Stenosis of the Esophagus Produced by the Compression of Metastatic Lymph Glands Arising from a Rhabdomyosarcoma of the Esophagus (Stenosi esofagea da compressione di metastasi linfoghiandolari mediastiniche per tumore rarissimo dell'esofago: Rabdomiosarcoma). DONATO MAINIERO. *Gior. ital. chir.*, 1954, 10: 301.

THE author presents a case of rhabdomyosarcoma of the esophagus with metastasis producing obstruction and perforation of the esophageal wall. The right main stem bronchus was ulcerated and communicated with the tumor, further complicating the clinical picture.

The patient was a 42 year old male who was admitted to the hospital because of mild dyspnea of 6 months' duration. For approximately 2 months the patient had experienced moderate fever, cough, and a general loss of health. Later he developed dysphagia for solid food and shortly thereafter was unable to swallow soft foods. Roentgenographic examination done 4 months following the onset of symptoms revealed a diminution in translucency of the posterior mediastinum with evidence of a mass at the tracheobronchial bifurcation. The symptoms grew progressively worse and the productive cough more severe. The patient began coughing up material with a fetid odor following the spontaneous formation of a bronchio-esophageal fistula. A palliative gastrostomy was carried out, but the patient died on the first postoperative day. Autopsy revealed a rhabdomyosarcoma of the esophagus ulcerating into the right bronchus with local metastasis.

A brief classification of tumors of the striated muscle of the esophagus is presented as follows: (1) the polypoid form, (2) the infiltrating ulcerative variety, and (3) the nodular form (rarest).

The paucity of early symptoms, the difficulty of diagnosis, and the high degree of malignancy of these tumors are discussed. —*F. W. Pirruccello, M.D.*

Esophageal Cancer in the Modern Practice of Surgicoroentgenological Co-operation; Postoperative Clinical and Roentgenological Study of Cancer of the Esophagus and Gastric Fundus (Il cancro dell'esofago nella moderna pratica di collaborazione chirurgico-radiologica; Studio clinico radiologico postoperatorio negli ammalati di cancro dell'esofago e del fondo gastrico). S. SERRANO and L. ROSSI. *Arch. ital. chir.*, 1954, 77: 249.

IN A preceding article the authors discussed the diagnosis and surgical treatment of esophageal cancer. In

this second article they refer to their experience with the postoperative treatment, and to the roentgenological and functional aspects of the new anatomical relationship to the gastrointestinal tract following surgery in the follow-up of some of their cases.

The authors base their report on 35 cases of carcinoma, 25 of the middle and lower third of the esophagus and 10 of the gastric fundus. Only 11 of the patients underwent resection, 11 others were explored and found inoperable, and the remaining 13 were considered inoperable when first seen. A brief summary of the postoperative treatment of these patients is given. Each patient was seen at monthly intervals after discharge from the hospital, and gastrointestinal examinations were carried out at the time of discharge, 1 to 3 months later, and at irregular intervals thereafter. Although the cases are reported in this article in some detail as to their postoperative course and extent of surgery, they are only 17 in number, 6 of which were instances of esophageal resection and gastroesophageal anastomosis, 4 of total gastrectomy, 1 of palliative esophagojejunal anastomosis, and 6 of exploratory thoracotomies. Thus, it is a small series.

Detailed descriptions of the roentgenological findings are given in the cases followed by periodical gastrointestinal examinations. Complications, studies on preoperative and postoperative gastric acidity, and tabulations on the survival periods in the group operated on are included. One patient is surviving after 16 months and 1 after 2 years.

—Roger H. L. Wilson, M.D.

A New Method for the Radical Surgical Management of Middle Thoracic Esophageal Carcinoma (Eine Neue Methode der radikalen chirurgischen Behandlung des mittleren thorakalen Oesophaguscarcinoms). K. NAKAYAMA. *Chirurg*, 1954, 25: 163.

POSTMORTEM studies were made to determine the conditions under which mobilization of the stomach with ligation of the various gastric blood vessels would best assure an adequate blood supply to the apical part of the gastric pouch used in esophagogastric anastomosis. The gastric blood vessels were injected with radiopaque material after the mobilizing ligations were done in order to visualize the extent of collateral circulation. It was found that in order to preserve an adequate blood supply to the apical portion of the mobilized gastric tube in total or subtotal esophagectomy, it is essential not to ligate the arterial arches running along the lesser and greater curvatures; in addition it is necessary to preserve either the right gastric or the right gastroepiploic artery. The practical application of these studies has been to reduce the ligation of the vessels of the greater and lesser curvatures to the minimum necessary for adequate mobilization. If the difficulties of mobilization are so great that an eventual disturbance of gastric circulation is likely, an antethoracic esophagogastric anastomosis is done.

The author's operative procedure consists of a right-sided approach with one incision extending around the thorax to the midline at the xiphoid process and thence continuing downward in the midline of the abdomen. The thorax and abdomen are exposed with one incision so that rib resection and a second incision are unnecessary. Spreading of the sixth and seventh, or of the seventh and eighth ribs affords a view of the extent of the lesion in the thoracic cavity and the degree of lymphatic spread in the region of the celiac artery. It also permits an evaluation of the situation of the gastric vessels and the best method of their ligation. The first step in the procedure is the mobilization of the esophagus and its surrounding connective tissue, after which the azygos vein is ligated and sectioned. The esophagus is then amputated above the infiltration and drawn down into the abdominal cavity through the diaphragmatic hiatus. This is possible without incision of the diaphragm. The radical extirpation of the tumor after careful freeing follows the mobilization of the stomach and the preparation of the gastric pouch. The gastric tube is then drawn into the thorax through the diaphragmatic hiatus and the anastomosis is performed.

The author states that his method simplifies the operative technique, reduces the operative blood loss, and markedly shortens the duration of the operative procedure. *—John L. Lindquist, M.D.*

MISCELLANEOUS

Mediastinal Cysts of Foregut Origin Associated with Vertebral Abnormalities. MARTIN FALLON, A. R. G. GORDON, and A. C. LENDRUM. *Brit. J. Surg.*, 1954, 41: 520.

THIS excellent article presents 2 cases in which mediastinal cysts of foregut origin were surgically removed with a successful outcome. In both instances there were associated abnormalities of the cervical and dorsal vertebrae. The discussion of the embryological implications of such cysts is enlightening and well illustrated. Such cysts are classified as bronchiogenic, intramural esophageal, and enteric. The bronchiogenic ones come from tissue proper to the respiratory tract. This is true also of the esophageal cysts. Enteric cysts which lie in the posterior mediastinum have a definite muscular wall and a lining of ciliated or alimentary type. These should properly be regarded as the final result of an abnormal extension of the lumen of the foregut produced on its posterior aspect by incomplete separation of the notochord. The vertebral abnormalities are produced by a consequent interference with the anterior fusion of the vertebrae.

Clinically there has been an increasing frequency of recognition of the triad of thoracic cyst, duplication within the abdomen, and anterior spina bifida.

The clinical implications of such congenital abnormalities are concisely discussed in the article.

—Benjamin F. Lounsbury, M.D.

Mediastinal Tumors. G. V. BRINDLEY, JR., and JOHN A. HENDERSON. *Am. Surgeon*, 1954, 20: 260.

THE authors review their experience in the cases of 97 patients with mediastinal tumors whose diagnoses were established surgically and who were treated at the Scott and White Clinic from 1946 through 1952. Seventy-one received irradiation therapy; 26 were treated surgically, with 1 death.

Of those who received irradiation, a diagnosis of lymphosarcoma was made in 36, Hodgkins disease in

8, and metastatic malignancy in 27. In the surgically treated group the following lesions were recorded: neurogenic tumor, 7 cases; lipoma, 5 cases; teratoid tumor, 2 cases; thymoma, 2 cases; and 1 case each of hyperplasia of the thymus, esophagenic cyst, bronchogenic cyst, thyroid, chondroma, tuberculoma, and carcinoma, type undetermined.

The authors classify mediastinal tumors as anterior, superior, or posterior, according to their usual location. A brief discussion as to origin, symptoms, diagnosis, treatment, and prognosis follows each type of tumor encountered in these locations.

Miscellaneous tumors of the mediastinum are discussed, and included in this group are parathyroid adenomas, lipomas, blood vascular tumors, chondromas, chondrosarcomas, and mesotheliomas.

Lastly, some lesions simulating mediastinal tumors are briefly discussed and complete diagnostic evaluation is emphasized to establish the proper diagnosis in these cases. The lesions considered are bronchogenic carcinoma, esophageal carcinoma, aneurysm, Boeck's sarcoidosis, inflammatory lymphadenitis, mediastinal empyema and diaphragmatic hernia.

—*Thomas Shields, M.D.*

The Relationship Between Mediastinal Lipomas and the Thymus. MORRIS RUBIN and SIDNEY MISHKIN. *J. Thorac. Surg.*, 1954, 27: 494.

A 19 YEAR old girl was subjected to resection of an anterior mediastinal tumor containing thymic and fatty tumor tissue. This prompted discussion as to the relationship of thymic tumors and lipomas of the anterior mediastinum.

On the basis of the involutional changes in a normal thymus, which in the second decade gradually changes so that the lipomatous tissue predominates, the authors contend that there is a distinct relationship between the two lesions. Only 3 cases with a mixture of thymic and lipomatous tissue have been reported since 1937. The term "lipothymoma" has been suggested for this lesion. The patients were all between 10 and 15 years of age. None had symptoms of myasthenia gravis. Most of the 58 mediastinal lipomas reported were in the anterior mediastinum and most of them had some attachment or prolongation in the thymic area. In some, thymic tissue was actually seen. Therefore, the authors believe that at an early age such a mediastinal tumor may be histologically identified as a lipothymoma. At later ages, after involution of the thymus has occurred, a lipoma is more common. A relationship between the thymus, dermoids, and teratomas of the anterior mediastinum, based on embryonal developmental similarities, is also suggested.

—*Harold M. Unger, M.D.*

Diaphragmatic Hernia (Der Zwerchfellbruch). MAX SAEGESSER. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 1.

IN patients with diaphragmatic hernia, a spurious shortening of the esophagus is not infrequently observed in the roentgenogram. This finding is due to the fact that the shadow of the cardia overlaps the shadow of the lower segment of the esophagus.

In 90 per cent of cases the hernial sac lies in front of the esophagus, in approximately 6 per cent of cases the sac lies behind the esophagus, and in the remaining 4 per cent a combination of both forms and a really shortened esophagus are found. If the hernia lies in front of the esophagus, the cardia is found within the thoracic cavity, while this part of the stomach remains in the abdominal cavity if the sac is located behind the esophagus. In both varieties, one is dealing with a sliding hernia because one-half of the hernial sac is formed by the gastric wall. Sweet's contention that only the anterior hernia is of the sliding type is not based on anatomic considerations.

The pre-esophageal, retroesophageal, or parahiatus hernia, and the combination of both types are acquired, whereas a diaphragmatic hernia with a real shortening of the esophagus is of congenital origin.

The symptoms are aggravated or provoked by postural changes. If the pain radiates toward the left shoulder and the left arm, the condition can be mistaken for coronary disease. Hematemesis or melena is observed in about one-third of all patients with diaphragmatic hernia. In the majority of cases peptic esophagitis is responsible for the bleeding and also for all other clinical symptoms such as heartburn, pain, belching, and disturbances of deglutition. Perforation of an ulcer into the thoracic cavity or acute incarceration of the stomach demand immediate intervention. —*Joseph K. Narat, M.D.*

SURGERY OF THE ABDOMEN

GASTROINTESTINAL TRACT

Perforations of the Stomach (Perforation d'estomac). G. CEULEMANS. *Acta. gastroenter. belg.*, 1954, 17: 254.

ONE hundred patients with perforation of the stomach were treated by simple suture. There was no mortality. Eight of the patients were females and 92 were males. All but 15 patients had a history of gastric ulcer prior to the perforations.

In all but 1 case, the perforations were situated on the anterior wall of the stomach immediately proximal to the pylorus. There was 1 case of traumatic perforation, caused by a sharp stick, on the posterior wall of the stomach, and 1 case of perforation of a malignant ulcer; in the remaining cases the lesions were benign.

In 2 cases, perforated gastric ulcers were unexpectedly found in patients explored for some other diagnosis which proved to be mistaken.

In 2 cases, exploration was done for perforated gastric ulcer and no ulcer was found. One of these patients had acute pancreatitis and the other had a stone in the ureter.

An attempt to demonstrate air under the diaphragm roentgenographically was not made in these patients. The author believes that free air can not be found in 30 to 50 per cent of cases.

Spinal anesthesia was used. The abdomens were opened through transverse incisions. The perforations were sutured with catgut and reinforced with a piece of the greater omentum. Free fluid in the peritoneal cavity in these patients is antiseptic and therefore it was not removed. No drains were used, and no gastric suction was used before, during, or after the operation. The patients were allowed out of bed the day following the operation.

Gastric resection for perforated gastric ulcer is not used by the author because it carries a mortality of 10 per cent. Furthermore, approximately 30 to 40 per cent of patients with perforated gastric ulcers will have no further symptoms after the perforation is closed.

Conservative treatment with continuous gastric aspiration also is not used by the author because the mortality following this procedure is also about 10 per cent. —*Frederick W. Preston, M.D.*

Melena; A Survey of 206 Cases. JAMES D. RIVES and ROBERT O. EMMETT. *Am. Surgeon*, 1954, 20: 458.

THE AUTHORS present a more comprehensive study with follow-up data on 129 cases of melena previously reported, and add 77 new cases, making a total of 206 patients seen at Charity Hospital, New Orleans, from March 25, 1950 to June 30, 1953. In 7 patients among this group of 206 cases, the diagnosis was made at autopsy, hence all statistical study is based on the remaining 199 cases.

Eighty-one per cent of the patients were over 40 years of age and 55 per cent were over 60 years; incidence of the condition was unrelated to racial difference, and males predominated (62.1 per cent).

Blood loss was estimated by red cell count, hematocrit, physical signs of blood loss, and the amount of blood loss required to correct shock. In 77 per cent of the patients there were signs of blood loss, and 43 per cent were in various stages of hemorrhagic shock on admission; 60.3 per cent required 2,000 c.c. or more of blood to combat shock. Hematocrit on admission was 30 or less in about half of the entire group of 199 patients. The quantity of tarry stools was not a reliable basis on which to estimate blood loss.

The source of bleeding was found in 94 of the 199 cases, as follows: the stomach in 6; duodenum in 31; jejunum or ileum in 6; ileum and colon combined in 4; colon in 9; rectum in 31; systemic diseases in 7 cases. In 51 patients there were equivocal sites of bleeding and there were 87 possible sources of bleeding; in 34 of the 51 patients, more than one possible site of bleeding was found.

A large majority of the equivocal lesions were in the gastroduodenal and rectosigmoid segments and over half were so grouped because diverticulosis was found with no actual proof of bleeding from these areas. Of particular interest was the fact that there were only 10 patients, of the 199, with bleeding due to lesions in the small bowel. Polyps of the large bowel were found in only 5 patients, and only 2 of these had evidence of bleeding from the polyps.

There were 145 patients in whom the bleeding site was thought to be established (94 in one group, 51 in the other). There were 23 malignant lesions, of which 15 arose from the gastrointestinal tract; the remaining 8 consisted of malignant blood dyscrasias, hence carcinoma of the gastrointestinal tract was not a common cause of massive melena.

In 54 patients (27.1 per cent) of the 199, no explanation for bleeding could be found. In 7 patients in whom melena was noted only at autopsy, the patients had been gravely ill and had severe jaundice, uremia, blood dyscrasia, or advanced carcinoma.

An analysis of relative values of diagnostic procedures employed to determine the site of bleeding in the 94 cases with proved sites of bleeding demonstrated that in only 16 instances did x-ray, laboratory data, proctoscopy, surgery, or autopsy reveal a site of bleeding which was unsuspected clinically; in 66 cases these procedures gave valuable confirmatory evidences. Sixty-three patients in this group were operated upon and in only one patient, who proved to have a Meckel's diverticulum, did surgery serve to establish the cause of the melena. Exploratory laparotomy was performed in 9 patients, but the procedure did not serve to establish the cause of bleeding. In 3 additional patients, equivocal sites were found; hence in 50 of the 63 patients operated upon, the diagnosis was evident prior to surgery.

Follow-up studies were made on 105 patients in whom the site of bleeding was equivocal or not found. Of this group, 76 were studied over a period averaging 9 months and during this period only 5 patients

had further melena and these were minor episodes. Repeated diagnostic studies revealed only two bleeding sites and one equivocal site which had escaped previous detection. Thus, only 2 patients actually benefited from these repeated clinic visits and diagnostic procedures. The need for better diagnostic approach is quite apparent.

There were 43 deaths in this group of 199 patients (21.6 %), 83.7 per cent occurring in patients over 60 years of age. This age group constituted 55 per cent of the entire series. —*Yoshio Sako, M.D.*

Sixteen Emergency Operations for Massive Gastric Hemorrhage (Sur 16 interventions d'urgence pour gastrorragies profuses). M. CHRISTIAN PIERRA. *Mém. Acad. chir.*, Par., 1954, 80: 391.

WITHIN 10 years the author observed 26 patients with grave gastroduodenal hemorrhages, 16 of whom required surgical intervention. To illustrate the gravity of the condition in the entire series, the author cites the case of one patient with cancer of the stomach who was so ill that subtotal gastrectomy could be performed practically without anesthesia.

The following conditions, responsible for the hemorrhage, were encountered: gastric or duodenal ulcer, schwannoma, ulcerative fibroma, diffuse hemorrhagic gastritis, cirrhosis of the liver, Banti's disease, and bleeding of obscure origin.

In 11 patients an extensive gastric resection was done, with 1 fatality, and a surprisingly smooth postoperative course in the 10 remaining cases. One patient with a very large juxtacardiac ulcer and extreme anemia succumbed to a gastroenterostomy. Another fatal outcome followed ligation of the coronary, pyloric, and left gastroepiploic artery in a patient with a gastric hemorrhage of undetermined origin. In one man with liver cirrhosis, no further hemorrhages occurred in the course of 4 years following evacuation of 1,000 c.c. of blood through a gastrotomy. Splenectomy failed to save one patient in the terminal stage of Banti's disease, who had had 7 episodes of hematemesis. One patient died 8 days after exploration, which disclosed a malignant tumor at the site of gastrojejunostomy.

In patients with a gastric lesion and a history of previous hemorrhages, conservative treatment is instituted. If the bleeding stops, gastrectomy is done 48 hours later, after the shock has subsided. If the hemorrhage persists or recurs, an emergency operation is performed. If there is no history of previous hemorrhages and no evidence of blood dyscrasia, a hepatic or splenic lesion, the same policy is followed. If the hemorrhage stops, every effort is made to establish the diagnosis. If a grave hemorrhage continues, procrastination may prove fatal. If a wide gastrotomy fails to demonstrate the source of bleeding, an extensive gastropylorectomy furnishes better results than a palliative intervention. —*Joseph K. Narat, M.D.*

Experimental Induction of Chronic Atrophic Gastritis with Various Types of Metaplasia. KAI SETÄLÄ, HARRY E. BLOMQUIST, GUSTAF WANGEL, and PAUL HOLSTI. *Ann. med. exp. fenn.*, 1954, 32: 82.

IT IS possible to induce experimentally various types of gastric alterations in animals of different species (monkeys, domestic rabbits, and guinea pigs) by injecting diethylamine oleinate intramurally into the stomach wall. Biopsies of the stomach showed that the gastric mucosa in the monkeys was normal before the experiment was started, and the development of the gastric lesions could in this way be followed closely.

The results of these investigations showed, in the writers' opinion, that an intimate relationship might exist between the alterations of the connective tissue elements and, especially, the mucus-secreting cells of the epithelium.

The investigation is being continued, and most of the animals are allowed to live as long as possible.

—*John J. Maloney, M.D.*

Gastrojejunal Ulcer. SAMUEL F. MARSHALL and R. KENT MARKEE. *Am. Surgeon*, 1954, 20: 248.

THE authors review 172 cases of surgically proved jejunal ulceration seen during the past 14 year period at the Lahey Clinic. In the majority of patients the jejunal ulcer developed following gastroenterostomy (77.3%) and in the remainder, following gastrectomy (22.7%). In 154 cases (89.5%) the original lesion was a benign duodenal ulcer. In 5 (2.9%) it was a benign gastric ulcer, and in 13 (7.6%) the location of the original peptic ulcer was not recorded.

Although the cause of jejunal ulceration is unknown, it probably is similar to that of duodenal ulcer and may occur after any operative procedure in which the jejunum is anastomosed to the stomach. Many factors may influence the development of a jejunal ulcer following the surgical treatment of peptic ulcer. The increased susceptibility of the jejunal mucosa to acid digestion is well known. Undoubtedly the patient's failure to remain on a suitable diet or to control his habits of living after surgical treatment is a major factor. As emphasized by the data presented in this series, location of the lesion and the type of operative procedure performed are important factors. Most jejunal ulcers following gastrectomy were found in patients in whom an insufficient resection was done. Likewise, in the authors' experience, 54 per cent of the exclusion types of gastrectomy have resulted in jejunal ulcers.

The average age of the patient with recurrent jejunal ulceration was 48.4 years; the youngest was 22 years and the oldest was 75 years. Of these patients, 91.3 per cent were males and 8.7 per cent were females.

The symptoms consisted of pain, hemorrhage, nausea and vomiting, diarrhea, and weight loss. The time interval of the onset of symptoms varied from 2 months to 32 years, the average being 6 years. Pain was the most constant symptom (80%) and hemorrhage next (43%). The diagnosis was established on the basis of the symptoms and upon the roentgenologic findings. The latter were positive in 72 per cent of the cases in this series.

The complications recorded by the authors were hemorrhage (43%), perforation (11%), obstruction (5.2%), and the development of a gastrocolic fistula (18.6). Obstruction was believed to be a more common complication than was noted in this series, for there was an additional group of 86 cases with malfunctioning gastroenterostomy stomas which were, in

the main, the result of stenosis or obstruction indicative of previous jejunal ulceration.

It is the authors' opinion that jejunal ulcers arising after partial gastrectomy should be given a fair trial of medical management. This should be carried out in the hospital, but if healing fails to occur, surgical treatment should be instituted early. The tendency to employ conservative medical measures after repeated recurrences is condemned.

A high gastric resection is recommended as the procedure of choice for a jejunal ulcer occurring after a gastroenterostomy. After a gastrectomy, if the original resection was inadequate, a higher re-resection should be done. An unremoved antrum should always be looked for in these cases and removed, if found present. A vagotomy is reserved for those cases in which an ulcer has occurred following an adequate resection of the stomach with complete removal of the antrum. The authors believe that it should be done through the abdomen so that an unremoved antrum can be looked for.

In the reported group, a total of 203 operations were done—148 for jejunal ulcer and 55, in stages, for gastrojejunocolic fistula. The procedure mortality was 2.9 per cent. Four deaths followed operation for jejunal ulcer and 2 followed a second stage operation for gastrojejunocolic fistula. It is interesting to note that in 2 cases it was necessary to do a total gastrectomy for recurrent jejunal ulcer following high radical gastrectomy and vagotomy.

The authors were able to follow 149 of these patients and jejunal ulcer was found to have recurred in 10 patients. —*Thomas Shields, M.D.*

Bleeding Peptic Ulcer of the Stomach and Duodenum (L'ulcère peptique saignant de l'estomac et du duodénum). W. F. Suermondt. *Acta gastroenter. belg.*, 1954, 17: 219.

The author's conclusions are based on the study of a series of 48 bleeding peptic ulcers treated by gastric resection during a 5 year period in the Surgical Clinic of Leyden, Holland. There were 45 men and 3 women. There were 31 gastric ulcers, 12 duodenal ulcers, 3 gastrojejunal ulcers, 1 recurrent ulcer of the duodenum following a Billroth I gastric resection, and 1 bleeding cancerous ulcer. Thirty-one of the 48 patients were more than 45 years of age. Thirty-five patients had hematemesis, and 13 had melena only.

In the differential diagnosis of patients vomiting blood or passing blood by rectum, or both, it is important to consider esophageal varices, hemangioma of the intestinal tract, and Meckel's diverticulum, in addition to peptic ulcer as the source of bleeding. Of the cases reported in the literature, the exact source of bleeding could not be determined in 15 to 20 per cent of patients at the time of operation.

In approximately 25 per cent of patients with bleeding peptic ulcer, the typical symptoms of ulcer are lacking. In 10 to 17 per cent of patients, hemorrhage is the first symptom of ulcer.

The physical examination is the most important diagnostic step; one should look for an enlarged liver, tenderness, or a mass in the epigastrium. The bromsulphalein test is useful in estimating liver damage. Examination of the blood to rule out blood dyscrasia is important. Roentgenography and gastroscopy should be used. In approximately 25 per cent of cases of bleeding from peptic ulcers, there is a bleeding superficial gastric erosion which can not be visualized roentgenographically. Gastroscopy will aid in establishing the diagnosis in these cases.

Operation is indicated when shock still remains after the transfusion of 1,200 to 1,500 c.c. of blood. The decision to operate should be made within 24 hours, sometimes within 1 hour. Shock and resulting anoxia of parenchymatous organs (brain, heart muscle, liver, and kidneys) are much more serious in patients who are over 45 years of age than in younger individuals.

An extensive subtotal gastrectomy with removal of the bleeding ulcer is the author's treatment of choice. In the present series of cases the mortality was 8.3 per cent (4 of the 48 patients).

—*Frederick W. Preston, M.D.*

Experiences with 327 Free Perforations of Gastric and Duodenal Ulcers (Erfahrungen bei 327 freien Magen-Zwoelffingerdarmgeschwuersperforationen). Hans Jirzik. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 277: 611.

In the years from 1939 to 1949, a total of 327 perforations in 325 patients with gastric, duodenal or anastomotic ulcer were encountered on the First Surgical Service of the Allgemeinen Krankenhauses St. Georg, in Hamburg. This group represented 13.2 per cent of a total of 2,455 peptic lesions. The highest percentage occurred during 1947. There was a remarkable predominance of perforation among males, i.e., 95 per cent of the total.

The typically acute onset of the condition and the x-ray finding of air under the diaphragm are mentioned as familiar diagnostic signs. Occasionally adhesions will prevent the free bubble of air from rising to the diaphragm. In 95.4 per cent of the cases in this series, surgery was undertaken with the correct diagnosis, or on a differential diagnosis necessitating immediate surgery.

Surgically proved sites of perforation were: the stomach in 186 cases, the duodenum in 137, anastomotic in 3, and the duodenojejunal junction in 1 case. Anterior wall perforation occurred 288 times, and posterior wall perforations, 26 times. Most perforations, gastric as well as duodenal, occurred in calloused ulcers. There was 1 case of perforated carcinoma and 1 case of sarcoma. Simple closure was carried out in 301 instances. Strong indications for primary resection were present in 7 cases in which the procedure was carried out. These were very recent perforations with marked stenosis of the pylorus, or cases in which carcinoma was suspected. All 7 of the patients survived.

Pulmonary complications occurred in 31 cases, wound infection in 43, postoperative atony of the stomach in 15, massive hemorrhage in 7, subphrenic abscess in 5, and clinical or x-ray evidence of stenosis during convalescence in 10 cases.

The overall mortality was 23.5 per cent; 52 of the deaths (two-thirds) were due to peritonitis. Follow-up studies were carried out on 126 patients and, of these, 25.3 per cent required later resection.

—*Harold Laufman, M.D.*

Pernicious Anemia and Cancer of the Stomach. Preliminary Report. JOHANNES MOSBECH. *Acta med. scand.*, 1954, 148: 309.

MANY previous reports have indicated that there is a higher incidence of gastric carcinoma in patients with pernicious anemia than there is in other patients of comparable age. Although no satisfactory explanation for this has been found, many workers have reported small series to indicate that some common hereditary factor may be responsible for this frequent coincidence of the two diseases. If this theory is true, the relatives of pernicious anemia patients would also be expected to show an increased incidence of gastric carcinoma.

To verify this, a series of 234 cases of pernicious anemia is reported, with a study of the incidence of gastric carcinoma in about 3,000 relatives of the patients. A similar number of relatives of 225 healthy persons were studied as a control group.

Of the 2,881 relatives of the patients with pernicious anemia, 108 died of gastric carcinoma, compared to only 33 deaths from gastric carcinoma among the 2,956 control relatives. There were also 16 cases of esophageal cancer in the first group and 11 in the control group. Cancer in other sites occurred in 147 of the first group and in 123 of the controls.

For further comparison, the expected mortality from gastric carcinoma in this number of persons was computed from the mortality in the Danish population as a whole. The computed expected mortality in the first group was 79.8 persons, compared to the actual mortality of 108. In the control series, the computed number of expected deaths was 75.2, while 33 deaths actually occurred. This reduced mortality in the control group compared to the population as a whole lacks a satisfactory explanation, but it is still significant that the first group had a higher mortality than did the control group or the general population.

It is concluded that there is some common hereditary factor which predisposes individuals to pernicious anemia and gastric carcinoma. Whether the individual develops either or both of these diseases probably depends on variations of various exogenous forces to which he is subjected. —*Stanley W. Tuell, M.D.*

The So-Called Dumping Syndrome After Partial Gastric Resection for Peptic Ulcer. N. HELLEMANS. *Acta med. Scand.*, 1954, 148: 367.

THE author analyzed the early postprandial complaints of patients who had undergone a partial gastric resection. He found that the so-called dumping syndrome occurred in 65 per cent of 100 patients subjected to the Billroth I operation and in 88 per cent of 100 patients subjected to the Billroth II operation. Whole milk food, especially, seemed to cause the syndrome, while sour milk products were well tolerated.

The author's studies suggest that hypofunction of the stomach that has been operated upon, achlorhydria, and accelerated gastric emptying time may be responsible for the disturbed digestion of proteins. Consideration is given to the proposition that this syndrome may be a manifestation of alimentary allergy. No support is given to the theory that sudden mechanical distention of the upper segment of the small intestine is a cause of the dumping syndrome. —*Robert Turell, M.D.*

Management of 3 Stomal Complications Following Subtotal Gastrectomy. KENNETH C. SAWYER and J. R. SPENCER. *Arch. Surg.*, 1954, 68: 500.

THREE important and distressing complications sometimes following subtotal gastrectomy are (1) the "dumping syndrome," (2) obstruction of the stoma between the stomach and the jejunum, and (3) bleeding from the stoma. The authors have illustrated successful and satisfactory management of these complications with typical case histories; the types of surgical management used have not been noted in the medical literature to date.

The authors have had a marked decrease in the incidence of the severe dumping syndrome since they have abandoned the Polya anastomosis and adopted the Hofmeister procedure with its much smaller stoma. It has been their policy to narrow the stoma in stable persons who have had dumping syndrome symptoms for more than a year. The abdomen is entered through an incision which splits the upper left rectus muscle. The residual stump of the stomach is opened longitudinally on its anterior surface. The wide gastrojejunostomy stoma is inverted into the gastrostomy wound. The mucous membrane around two-thirds of the stoma is excised down to the muscular layer. The raw surfaces are approximated with fine chromic absorbable surgical (gut) suture material so as to narrow the stoma to admit one and one-half fingers. The opening in the stomach is closed with one row of gastrointestinal suture and one cotton musculoserosal layer. The abdominal wound is closed with fine gut and nonabsorbable surgical (silk) sutures.

Temporary obstruction of the gastrojejunal stoma following subtotal gastrectomy is another complication which occurs on occasion. The condition is usually a result of atony, stomal edema, or inertia secondary to adynamic ileus. As a rule, the retention disappears after repeated aspirations or continuous gastric suction. However, when retention persists after subtotal gastric resection, definitive treatment should not be delayed until the patient becomes too debilitated. Often the retention is a result of a mechanical obstruction at or near the anastomosis. The most frequent cause of this type of obstruction is retraction of the jejunal loops into the lesser peritoneal cavity.

The following is a method for correcting this condition with minimal tráuma to the recent operative site. An incision is made in the anterior wall of the stomach well above the obstructed anastomosis. The second and third fingers of the left hand are placed in the proximal and distal jejunal loops and the adherent mesocolon is dissected free from them. The transverse mesocolon is resutured to the stomach wall proximal to the anastomosis. A limb of an Alesen T-tube is placed in each jejunal loop. The gastrostomy is closed with one row of fine catgut sutures and a musculoserosal layer of cotton sutures.

Bleeding from a gastrojejunal anastomosis of sufficient severity to warrant reopening the abdomen is unusual. Moderate bleeding can be controlled by lavaging the stomach frequently with sterile water heated to 120 degrees F. If, however, it is impossible to stabilize the patient's blood volume, immediate

reoperation is necessary. The blood pressure, pulse rate, and hematocrit reading should be the criteria upon which the decision is based. In their illustrated case, the authors disconnected the posterior gastroenterostomy, a portion of the jejunum was resected, and a high subtotal gastric resection was performed. The duodenal stump was closed with two layers of catgut sutures and one of cotton sutures of the musculoserosal layer. Gastrointestinal continuity was reestablished by the Hofmeister modification of the posterior Polya procedure. An end-to-end jejunojejunostomy was accomplished. The jejunal mesentery was closed with a cotton suture, and the transverse mesocolon was sutured to the stomach proximal to the anastomosis. Two Penrose drains were placed in Morison's pouch and brought out through a stab wound. The blood loss was estimated and replaced. The patient left the operating room in good condition, with a blood pressure of 130/80 and a pulse rate of 100. The patient was returned to his room in good condition. Convalescence was without incident, and he was discharged from the hospital on the ninth postoperative day.—*Robert Turell, M.D.*

Nutrition Following Subtotal Gastrectomy of 4 Types (Billroth I and II, Segmental, and Tubular Resections). LLOYD D. MACLEAN, JOHN F. PERRY, WILLIAM D. KELLY, DONN G. MOSSER, and Others. *Surgery*, 1954, 35: 705.

THIS investigation has been conducted to determine the causative factors of weight loss after gastric resection and to apply therapeutic measures rationally.

The relative importance of the following factors have been assessed: abnormal fat and nitrogen loss in the stool, decreased oral intake, pancreatic function (evaluated by the secretin test after subtotal gastrectomy), and the significance of gastrojejunal anastomosis versus gastroduodenal anastomosis, with and without preservation of the vagus nerve continuity.

The only reliable methods of investigation presently available to discover objective information on this subject are metabolic (intake-output balance) studies and accurate records of weight change after operation. This investigation was conducted on 35 patients who had the following operations from 3 months to 5 years previously: Billroth I and Billroth II subtotal gastrectomies, segmental gastric resection, and tubular gastric resection. The patients selected were not special nutritional problems, nor did they present particularly favorable results; the decision for study rested entirely with the patients.

All of the patients were admitted to the hospital for 8 to 10 days, during which time the following studies were made: routine history and physical examination with special inquiry into eating habits and gastrointestinal symptoms; determination of the hemoglobin, erythrocytes, leukocytes and differential mean cell diameter, reticulocytes, blood urea nitrogen, and total serum protein; roentgenologic examination, with barium, of the esophagus and upper gastrointestinal tract, as well as estimation of the transit time to the cecum; measurement of the fecal fat and nitrogen excretion based on several collections, with carmine dye orally to mark the interval; a weighed diet containing 145 gm. of carbohydrate, 80 gm. of fat, and 80 gm. of protein with a total of 1,620 calories was offered, and the amount eaten was calculated.

A study of the pancreatic function was made by aspiration of the intestinal content below the gastric pouch before and after secretin was given intravenously. Two tubes were directed into the gastrointestinal tract under fluoroscopy. One tube with a mercury balloon at its tip was placed as close as possible to the ampulla of Vater. A 9 hole gastric tube was positioned in the gastric pouch and both tubes were placed on suction. The intestinal aspirate was collected under ice, frozen, and the following determinations were made: volume, *p*H, amylase, lipase, trypsin, and bicarbonate. Two 30 minute fasting samples were collected, following which secretin, I unit per kilogram, was injected intravenously, and three 20 minute samples were collected, all results being combined for the 1 hour period.

It was found that 3 of 9 patients excreted an abnormally large amount of fecal fat after Billroth II gastrectomy. One of 5 patients excreted a borderline quantity of fat after the Billroth I procedure. Segmental resection resulted in an abnormally large fat loss in the stool in 5 of 16 patients. Fat excretion was normal in the 5 patients who had tubular resection. Excessive stool nitrogen loss is an infrequent occurrence following subtotal gastrectomy.

Thirty-two of the 35 patients who were studied lost weight. The average loss was 21 pounds. Large weight losses are possible with normal fat and nitrogen excretion in the stool and are closely related to decreased food intake despite several meals a day. Weight loss was considerably less when compared to ideal weights for each individual concerned. Large weight loss is not closely related to rapid small bowl transit time or to diarrhea. Gastroduodenal continuity does not prevent excessive fat loss in the stool, since this feature occurred following segmental gastric resection.

Pancreatic function determined by the secretin test, as described, following subtotal gastric resection was normal in most patients. It may be that rapid small bowel transit separates the food and enzymes in the presence of normal pancreatic function. Of the factors evaluated to account for weight loss in 35 patients after subtotal gastrectomy, decreased oral intake or loss of gastric reservoir capacity was of greatest importance. Increased fecal fat excretion is an additional cause of weight loss in some patients. Investigations for the future would be advantageously directed by increasing the caloric intake in patients following subtotal gastrectomy. —*John H. Mohardt, M.D.*

Postcibal Symptoms After Partial Gastrectomy for Peptic Ulcer. STEN MEURLING. *Acta Soc. med. Upsaliensis*, 1953, Supp. 3.

POSTCIBAL symptoms have been studied by means of a follow-up investigation and by various tests on particular groups of patients. Six hundred and twenty-four patients who had undergone partial gastrectomy for peptic ulcer were followed up for periods of ½ year to 15 years after operation.

The most common early symptoms after meals were weakness, fatigue, a feeling of fullness or tightness in the abdomen, nausea, or a general feeling of uneasiness. Less common symptoms were a sense of warmth throughout the body, sweating, pallor or

flushing of the face, palpitation, dizziness, headache, vomiting, and diarrhea.

Women had symptoms more often than men. No difference was found between patients operated on for gastric and duodenal ulcer, nor did the type of operation importantly affect the appearance of symptoms. Postcibal symptoms usually developed in from 1 to 2 months after the operation. In 40 per cent of the cases the symptoms persisted; in the remainder there was improvement in the course of time.

In some cases there were obvious allergic symptoms such as urticaria and vasomotor rhinitis. Fluid food and liquids were very apt to provoke symptoms. Forty seven per cent of the patients could not tolerate milk; 20 per cent could not tolerate sweets.

X-ray examination with barium meals demonstrated no difference between patients with and without postcibal symptoms.

In the treatment, good results were obtained with small doses of procaine hydrochloride perorally. The avoidance of liquids with meals, and the exclusion of milk and other particular foodstuffs, are important and usually result in improvement.

It is concluded that the symptoms usually emanate from the small intestine, and that the degree of sensitivity of the small intestine determines the appearance and intensity of postcibal symptoms. The symptoms may be regarded as the response of the small intestine to a sufficiently strong nonspecific irritation.

—*Samuel Kahn, M.D.*

Acute Obstruction of the Small Intestine; Analysis of 154 Cases. THEODORE G. DRUGAS and CHARLES A. SCHIFF. *Arch. Surg.*, 1954, 68: 612.

THE authors have analyzed 154 consecutive cases of acute obstruction of the small intestine at the Michael Reese Hospital, Chicago, from 1945 through 1950. The mechanisms of obstruction were as follows: fibrous bands and adhesions in 62 cases; inflammatory adhesions in 6; intussusception in 48; volvulus in 6; internal hernia in 6; primary tumor in 2; gallstone ileus in 5; congenital atresia and stenosis in 9; mesenteric vascular occlusion in 3; and other causes such as unsatisfactory anastomoses, in 7 cases.

Among the 62 cases of fibrous bands and adhesions, 22 occurred in the age group of 21 to 40 years, and 22 in the age group of 41 to 60 years. In 31 of the 48 cases of intussusception, the condition occurred in the first year of life, and in 17 cases it occurred in patients over 1 year of age, the oldest one being a 9 year old boy with Meckel's diverticulum. Eight of the 9 patients with congenital atresia were seen in the first few days of life and 30 per cent of these patients were premature infants, all of whom died.

One-hundred and twenty-two of the patients were operated upon for relief of obstruction. There was no mortality among 40 patients who were operated upon within the first 24 hours of the onset of the symptoms. Thirty-five patients were operated upon 4 or more days after the onset of symptoms, with a mortality of 5.7 per cent. Thirteen patients were operated upon 49 to 72 hours after onset of symptoms and the mortality was 15.4 per cent; 15 patients were operated upon 73 to 96 hours after the onset of symptoms and the mortality rate was 20 per cent.

Twelve patients with obstructon due to fibrous bands or adhesions, and 1 patient with obstruction due to inflammatory adhesions were treated successfully without surgery.

Six patients with intussusception were treated by barium enema reduction; 1 patient died before any treatment could be begun.

The mortality rate increased with the severity of damage to the bowel. Patients with gangrenous bowel averaged 96 hours after the onset of symptoms, and the mortality rate was 78.5 per cent. The distressing point is that there was no reliable way of distinguishing a strangulating from a nonstrangulating obstruction. In general, it appeared that a white blood count of over 15,000, a rectal temperature of over 101 degrees F., and a pulse rate of over 100 usually indicated a strangulating obstruction, but absence of these findings did not rule out strangulation.

A significant point was that of the 62 patients who had obstruction due to adhesions and bands, 53 had had previous abdominal operations of which gynecological procedures and appendectomies were the commonest. The period of time which had elapsed from the previous surgery to the onset of obstructive symptoms varied from 5 days to 45 years.

There were 19 deaths in the entire series. In 8 of the fatal cases, operations had been performed. Of the remaining 11 patients not operated upon, 5 were seen in a terminal state, in 5 the correct diagnosis could not be established, and 1 patient died of unrelated causes. The mortality rates were highest in infants and elderly patients. Of the 8 fatal operative cases, death in 5 was due to acute peritonitis resulting from leakage from a suture line; in 1 case death was due to biliary peritonitis, in 1 case aspiration pneumonia, and in 1 case infarction of the small intestine.

The overall mortality rate in the series was 12.3 per cent. When correction was made for patients admitted in a moribund state, the mortality rate was 9.9 per cent. The authors emphasize the need for early determination of impending strangulation since this complication accounted for 84 per cent of the fatalities.

—*Yoshio Sako, M.D.*

Stenosing Hyperplastic Tuberculosis of the Terminal Ileum (Tubercolosi iperplastica stenosante dell'ileo terminale). R. GENNARI and E. SEGA. *Arch. mal. app. diger.*, 1954, 20: 16.

A 23 YEAR old patient had been ill for more than a year. He suffered from intermittent abdominal cramps localized in the right lower quadrant. These attacks were accompanied by diarrhea and some elevation of temperature. During one of these attacks he was operated upon for appendicitis with no change in symptoms. In April 1951, he developed rather severe symptoms and was again hospitalized. He was considered to have intestinal obstruction and was operated upon.

At operation the terminal ileum was found to be rigid and hard for a distance of 12 cm. A hemicolectomy was performed, including an ample length of normal bowel above the involved segment. A side-to-side anastomosis was made with the transverse colon. The abdomen was closed without drainage.

The postoperative course was good and the wound healed by first intention. The pathological study revealed hyperplastic tuberculosis but the tubercle bacillus was not found.

The authors discuss the differential diagnosis including neoplasms and Crohn's disease, and bring out the essential features of the various conditions to be considered. —*Lucian J. Fronduti, M.D.*

The Role of Surgery in the Therapy of Ulcerative Colitis. JOHN H. GARLOCK and ALBERT S. LYONS. *Gastroenterology*, 1954, 26: 709.

BECAUSE of conflicting opinions concerning the role of surgery in the treatment of idiopathic nonspecific ulcerative colitis, considerable confusion has attended the therapy for this disease. One group, the most radical, suggests that these patients should be operated upon early in the disease; another, the most conservative, believes surgery is only rarely indicated. A smaller group believes that many of these patients can be treated by psychiatric methods. Ulcerative colitis, essentially a disease of youth, is more prevalent in large urban centers where the stress and strain of everyday life is greater. This disease is accompanied by spontaneous exacerbations and remissions and the latter may extend over a period of years. Another characteristic suggested is the unpredictability of the therapeutic response to a specific remedy. Oftentimes a spontaneous change in an acutely ill patient with ulcerative colitis may occur within a period of 24 to 48 hours, and the patient goes on to rapid recovery.

The authors' concept of the rational approach to the surgical treatment of this disease is based on four simple premises: (1) treat the pathological complications of the disease; (2) save life in the occasional acutely toxemic patient who does not respond to conservative therapy; (3) remove the colon after study indicates that irreversible pathologic changes have taken place; and (4) the development of polyposis makes colectomy obligatory because of the high incidence of carcinomatous change.

The present report related experiences with 254 patients who were treated by surgical measures over a period of 15 years. In the simple classification suggested ulcerative colitis is divided into groups according to the location of the disease: (1) universal colitis; (2) right-sided colitis; (3) left-sided colitis.

Universal colitis was found in 145 patients. As to the indications for operation in universal colitis, no dogmatic rule can be followed. The authors emphasize the importance of treating the complications of the disease. Pericolonic abscess is indicative of a gradual ulcerative penetration throughout the entire thickness of the colonic wall. Incision and drainage of the resultant abscess may be necessary for relief of tension and pain. However, there follows persistent external fecal fistula at the drainage site, which indicates extensive colonic disease of the irreversible type and thus demands a diversion of the fecal current by ileostomy and subsequent colectomy.

Perianal abscesses during the course of ulcerative colitis are common but do not in themselves indicate advanced proctitis and thus may not require a diversionary ileostomy.

Internal fistulas between diseased large bowel and adjacent organs such as the small bowel or bladder are not as common as with regional ileitis. The fistula-in-ano complicating ulcerative colitis is serious in that it is associated with extensive disease in the rectal wall and demands ileostomy and complete colectomy. It is doubtful whether any local operation should ever be undertaken for these fistulas. The presence of a rectovaginal fistula indicates extensive disease and no attempt should be made to repair such fistulas. The fecal current must be diverted by ileostomy, and subsequent therapy will vary in the individual instance. Occasionally intestinal continuity after multiple operative procedures can be re-established.

In cases of uncontrollable bleeding in ulcerative colitis, an ileostomy will frequently stop the bleeding.

Impending perforation of the colon during the acute phase can be controlled by a diverting ileostomy, especially if the symptoms of impending perforation persist for more than 24 hours.

In the treatment of sudden free perforation of a colonic ulcer with peritonitis, one must do an immediate laparotomy, supplemented by massive antibiotic therapy. Rarely will it be possible to close the perforation. Oftentimes a subtotal colectomy and ileostomy is justified, but this will depend upon the surgical judgment at the time of surgery

In the cases of irreversible changes in the bowel, ileostomy and colectomy will salvage many of these patients. Within a period of 3 to 5 months these patients are often transformed from chronic complaining invalids to healthy, agreeable members of a community.

The development of polyposis in advanced ulcerative colitis is an imperative indication for surgical intervention, because of the high incidence of malignant transformation in these cases.

In patients with acute fulminating disease of ulcerative colitis, it is very difficult to decide on a form of therapy to be employed. The authors have given up the emergency ileostomy operation in these cases. The recent advent of ACTH and cortisone has changed the serious aspect of this form of the disease considerably. The use of these hormones indicated that in toxic cases usually sufficient improvement is observed to permit the performance of the surgical procedure with much less risk than heretofore. It has been noted that the surgeons are now being called to see these patients in acute fulminating stages earlier than in former years, and operation is undertaken before a near moribund condition is reached.

When ileostomy is decided upon in ulcerative colitis, the surgeon is committed to proceed with colectomy at a later date or, in selected cases, at the same sitting. The authors are opposed to the general principle of closure of ileostomies while the colon is still in situ. They are also opposed to the performance of ileostomy in patients with minimal disease. Ileostomy is the first step of a graded procedure for complications of the disease, for irreversibility of bowel involvement, for polypoid degeneration, and for many patients with acute toxemia, as a life-saving measure.

In the patient who is to have a colectomy as a two-stage operation, it is advisable to remove the colon 3 to 6 months after the ileostomy. After the colectomy operation is completed, a continued observation of the remaining portion of the sigmoid and rectum is in order. Stricture formation, polyposis, continuing friability with bleeding, extensive perianal scarring with loss of sphincter control, the result of previous infection, and extensive rectovaginal fistula constitute indications for further removal of the remainder of the bowel. In carrying out the abdominoperineal resection, one need not be as radical in the removal of the perirectal structures. The surgeon must exert every effort to avoid impotence in young men by preserving the presacral plexus. Occasionally reanastomosis to the remaining rectum has been done. Among 7 patients in whom the reanastomosis was done, 4 have remained well—one of these for as long as 10 years.

Important postoperative complications are emphasized. Electrolyte shock may occur following ileostomy, due to excessive outpouring of fluid and electrolytes. Replacement intravenous therapy is life-saving. Bowel obstructions are very common after ileostomy, and have occurred in 12 per cent of the authors' patients. One-third of these required reoperation. Major skin excoriations are common; however, since a routine application of an ileostomy bag on the second or third day after operation was adopted, this complication has been rare. Wound separation has occurred; however, since placing the ileal stoma in a stab wound, this complication has been obviated. Prolapse has been uncommon in their experience; approximately 2 per cent of the patients have had prolapse. It is obvious that the fixing of the mesentery of the ileal stoma to the parietal peritoneum is of major importance. Ileostomy fistula from improperly placed ileostomy bags has occurred and the incidence has been about 8.9 per cent. Retraction and superficial stenosis of the ileostomy have occurred in about 3.4 per cent of the patients, and have required operative revision. Enteritis has occurred increasingly as a complication (ileitis proximal to the stoma).

Right-sided colitis may be considered as a lower ileocolitis as well. The surgical indications listed for universal colitis hold true for this variety except that in the right-sided colitis it is advisable to operate much earlier, before the spread of the pathologic process reaches the sigmoid and rectum. The performance of an ileosigmoidostomy in these cases depends upon the condition of the rectal mucosa. In left-sided colitis, again the surgical indications are identical as for universal colitis.

In 254 cases of universal right-sided and left-sided colitis, the mortality rate was 17.7 per cent. The operative mortality among 464 procedures in the three types of colitis was 7.9 per cent.

—*John E. Karabin, M.D.*

Diagnosis and Treatment of Carcinoma of the Colon
(Zur Erkennung und Behandlung der Kolonkarzinome). H. J. Betzler. *Deut. med. Wschr.*, 1954, 79: 750.

The diagnosis and treatment of carcinoma of the colon are discussed on the basis of a series of 74 cases under observation by the author. He noted that at the time of admission for surgery, the symptoms complained of were more severe the further anal the location of the tumor. Thus, proceeding downward, 16 patients with carcinoma of the cecum had suffered from disturbances of intestinal motility without ileus, 26 patients with carcinoma between the cecum and sigmoid had suffered from chronic progressive or remittant ileus, and 32 patients with carcinoma of the sigmoid had suffered from subacute or acute ileus.

It is emphasized that besides the transition from absolute latency to relative latency and manifest disease, there may in some cases be a direct transition from the stage of absolute latency to that of manifest disease. Thirty-one of the patients here discussed were admitted with subacute or acute ileus, and in 8 patients with carcinoma of the sigmoid, ileus had developed without premonitory symptoms. Half of the patients are threatened in the late stages by sudden obstruction of the intestine and its sequelae. Besides the mechanically produced disturbance in elimination and resorption, all patients likewise suffer from hepatogenic protein deficiency, especially as the result of direct absorption of toxic tissue autolysates from the usually enterogenously infected carcinoma. In this connection, the tumors located in the vicinity of the porta circulation right in front of the liver offer the greatest threat.

Of surgical importance is the fact that multiple carcinomas are encountered in 5 per cent of cases. The age and the sex incidence of carcinoma of the colon are reviewed. In the present series the average age incidence for carcinoma of the cecum was 54 years, and for carcinoma of the sigmoid, 60 years.

The significance of predisposition and of heredity is discussed. In the present series this significance was emphasized by the incidence of an adenocarcinoma of the cecum near the valve of Bauhini in a man of 60 years, and of a colloid adenocarcinoma of the cecum metastasizing to the lymph nodes in his daughter at the age of 27 years. Another instance is described in which a man of 32 years was operated on for an invaginated colloid carcinoma of the ascending colon. His brother, a man 28 years of age, was operated on for a mucus-forming adenocarcinoma and polyposis of the transverse colon, and 5 weeks later for a simple carcinoma of the cecum and papilloma in the course of malignant degeneration. This observation was of significance as indicating that carcinoma of different origin may develop simultaneously in one organ.

The early and late symptoms of the 74 cases in this series are tabulated. In carcinoma of the cecum, intestinal obstruction was unusual both in the early and later stages. In tumors located at the ileocecal valve, ileus of the small intestine developed in 3 cases after a duration of 2 to 4 months. Initially, slight and occasional pains were usually located in the right lower abdomen. In patients with tumors of the upper cecum and ascending colon, spasmodic pain and early bloating, pressure sensation, and a feeling of fullness were noted. Loss of weight and disturbances of bowel evacuation, as well as palpable tumor, were rarely observed and, where present, indicated an advanced stage of the disease. Macroscopically, demonstrable bleeding from a carcinoma of the right colon was rare. Enterogenous infection of a tumor penetrating

the intestinal wall may cause a pseudoappendicitis by irritation of the peritoneum. Three such cases are described.

Symptoms in carcinoma of the flexure, and of the transverse and descending colon are usually those of chronic progressive or remittent obstruction. Besides pain in the tumor region, there will often appear prodromal symptoms of mechanical obstruction of the intestine even while the tumor is small. In one-third of the cases, more or less complete ileus developed at the height of the disease, with attacks of stenosis, loss of appetite, and borborygmus. Even in advanced stages, the tumor was palpable in only 5 of 20 cases and had caused difficulties in differential diagnosis from coloptosis.

In carcinoma of the sigmoid, disturbances in evacuation dominate the picture even in the early stages, with constipation, diarrhea, tenesmus, blood, and mucus. Bleeding over periods of months without other manifestations was typical for polyposis of the large intestine. It has been estimated that 50 per cent of all carcinomas of the large intestine have their origin in polyposis. Extensive resection of the involved segment is indicated to include polyps possibly in the course of malignant degeneration. About one-fourth of the patients with carcinoma of the sigmoid had suffered pain for 1 to 12 days before admission with symptoms of acute ileus. In 3 cases the tumor was found to have perforated into the free abdominal cavity.

Irrigoscopy will not only reveal the site of the tumor, but also its mobility, its extent, the shape of the filling defect, and eventual perforations, thus providing important indications as to operability. Rectoscopy is not entirely without danger and is useful only when the tumor is situated very low down in the colon. Sedimentation rate, hemoglobin determination, and search for occult hemorrhage in the stools are simple and valuable methods. The sedimentation rate falls only in the presence of inflammation or resorptive liver injury. The most important prognostic indications are obtained from the operative findings, which show the local infiltration and extent of glandular involvement. Histologic findings are of no aid prognostically. Since the paths to the main glands may be involved primarily with metastases, as large as possible a portion of the tumor-bearing segment with the related megacolon should be removed. There are also direct connections with the glands in the region of the head of the pancreas and via the gastrocolic ligament to the lymph glands of the spleen.

It is impossible to determine the line of resection from palpatory findings, since the latter will not indicate the degree of infiltration of the submucosa and muscle. Invasion of the muscle is most common in carcinoma of the lower colon with stasis of inspissated feces. In tumors of the left colon there is more tendency to stenosis and outward extension of the neoplasm. Survivals are more frequent in the voluminous cancers of the right colon that protrude into the lumen of the intestine.

In the present series of 74 cases, the glands were not involved in 38 cases, glandular metastases were present in 16 cases, and infiltration of adjacent organs with metastases was present in 20 cases.

In doubtful cases, rapid histologic diagnosis during operation is important since palpation will not indicate whether the lymph nodes are carcinomatous or merely inflamed.

If the tumor can be resected but has distant metastases, the primary tumor should be removed, since survival may be prolonged, especially in cases of solitary liver metastases. Palliative resection may be indicated to prevent putrefaction, hemorrhage, and functional disturbances of the intestines, at least temporarily. In some instances the intestinal disturbances have been attributed to autoanaphylaxia as a result of resorption of enterotropic substances from the ulcerating tumor. The use of preoperative sulfonamides and antibiotics, the correction of protein deficiencies, and use of modern anesthetic methods have considerably improved the prognosis, and for this reason particularly it is important to have patients come early for treatment. —*Edith Schanche Moore*

Indications for Total Colectomy (Le indicazioni della colectomia totale). ROBERTO DAMIANI and UGO FILIPPINI BATTISELLI. *Medicina*, Parma, 1953, 3: 847.

The authors present the following indications for total colectomy:

1. Malformations of the colon: idiopathic megacolon in adults in whom there is a possibility of obstruction (2 cases); symptomatic megacolon from prolonged distention of the colon, caused by organic obstruction of the rectum; segmental megacolon, where conservative management has failed; Hirschsprung's disease in children; microcolon and atresia of the large bowel (2 cases in infants 24 and 48 hours old, respectively, in which total colectomy and ileostomy were followed by a fatal termination in 12 hours).
2. Inflammatory diseases of the colon: ulcerative colitis, tuberculosis of the colon, and diverticulitis.
3. Tumors: multiple polyposis (1 case); carcinoma of the rectosigmoid with megacolon (1 case).

—*Alexander F. Conte, M.D.*

Surgery of Rectal Carcinoma (Chirurgie du cancer du rectum). G. DAUMERIE. *Acta chir. belg.*, 1954, Supp. 2.

THIS monograph is based on observations of cancer of the rectum accumulated in the course of 20 years at the Surgical Clinic B of the University of Louvain in Belgium.

The middle ampullary, high ampullary, supraampullary, and low ampullary regions, the rectosigmoid and the anal canal were affected in the given order in descending frequency.

Abdominoperineal amputation was done in 45.6 per cent of the cases, and the problem of preservation of the sphincters arose in the remaining 54.4 per cent.

The ulcerating type was more frequent than the fungating or annular lesions.

The necessity of a complete excision of the superior hemorrhoidal artery up to its origin is stressed, while the routine sacrifice of the inferior mesenteric artery for cancer of the intraperitoneal portion of the rectum is not considered essential.

The average period between the onset of symptoms and admission to the hospital was 7 months.

As a rule, the resection was carried at least 5 cm. below and 20 cm. above the lesion.

If the uterus and the vagina were invaded, hysterocolpectomy was performed at the time of abdominoperineal amputation.

All operations were done under fractional spinal percaine anesthesia. The author emphasizes the importance of perineal drainage and of peritonealization of the pelvic floor. He never places a drain in the peritoneal cavity.

Antibiotics were given the first 10 postoperative days. The most frequent complications of amputations of the rectum were stenosis, and prolapse or cicatricial hernia of the artificial anus, while after resection leakage of the suture line, intrarectal stenosis with fistula formation, and incontinence of the sphincter were observed.

Seventy-two per cent of the entire series of 476 cases were operable.

The author advocates radical amputation in preference to sphincter-preserving resection which, as a rule, is not sufficiently radical and does not always preserve the continence of the sphincter.

Postoperative irradiation was employed in young individuals because they tolerate it well.

—*Joseph K. Narat, M.D.*

Abdominoperineal Resection with Sphincter Preservation for Carcinoma of the Midrectum. JOHN M. WAUGH, EDWARD M. MILLER, and FRANK T. KURZWEG. *Arch. Surg.*, 1954, 68: 469.

SINCE 1944 Waugh has performed combined abdominoperineal resection with preservation of the anal sphincter for selected lesions of the middle third of the rectum, reserving the Miles procedure essentially for lesions involving the lower 5 cm.; when possible, he performed anterior resection with primary anastomosis for lesions located 10 cm. or more from the anal margin. This report is an evaluation of the group of patients that were subjected to the sphincter-preserving combined abdominoperineal operation for carcinoma of the rectum.

From August, 1944, through December, 1950 there were 165 patients with rectal cancer who underwent combined abdominoperineal resection with preservation of the external anal sphincter, and they are the basis of this report. Essentially the anal canal is carefully dissected from the underlying external sphincter muscle bundles (both superficial and deep). The attachments of the levator to the thin rectal wall are severed circumferentially. This dissection is continued upward until the abdominal dissection is attained. With the mobilization complete, the rectum and lower part of the sigmoid are drawn through the sphincteric orifice, the external sphincter being dilated with retractors to allow free passage. The site of the new sigmoid anus is identified, the excess bowel removed, and the bowel anchored by suturing fat tags to the perineal skin. A No. 24 rectal catheter is then inserted into the sigmoid and held in position by a purse-string suture. The presacral space is drained with a sump drain extending between the sigmoid and the sphincter.

The method described was utilized in 114 cases (69.1%). It has been the most satisfactory although the modification of Babcock's perineal dissection was used in 51 cases (30.9%).

There were 6 hospital deaths in this series of 165 operations, constituting a mortality rate of 3.6 per cent. In the group of 21 cases in which the operation was considered only palliative, there was 1 hospital death, a mortality rate of 4.8 per cent. In the remaining group of 144 procedures, there were 5 deaths, a mortality rate of 3.5 per cent. Generalized peritonitis secondary to extensive infarction of the large bowel occurred in 1 case. There is a tendency to thrombotic complications in these patients and they are now given prophylactic anticoagulant therapy beginning 48 hours after operation. One or more postoperative complications which were nonfatal occurred in 82 patients (49.7%). These consisted of presacral infection in 38, urinary retention in 33, bowel retraction or slough in 17, cystitis in 11, thrombophlebitis of the lower extremities in 8, sigmoidovaginal fistula in 3, and miscellaneous complications including urethrocutaneous fistula and anterior wound abscess. There were 101 men in this series. Five are excluded from the statistical analysis concerning sexual dysfunction and 10 (10.7%) of the 93 remaining had difficulties in this regard.

Of 165 cases, 156 (94.5%) have now been followed up. Of the 165, 55 underwent operations 5 or more years ago. There were no hospital deaths. Fifty-two (94.5%) of these patients have been traced. Seven underwent palliative procedures and are eliminated from this statistical analysis. Of the remaining 45 patients, 23 (51.1%) have survived 5 years. There have been 114 patients on whom operations were performed 3 or more years ago. Three patients died in the immediate postoperative hospital period. It has been possible to trace 106 (95.5%) of the remaining 111 patients. Excluding 13 patients whose operations were deemed palliative, there are 58 (62.4%) of the 93 patients who have survived for 3 or more years. In 20 of 45 traced patients who underwent operations 5 or more years ago, the regional nodes were involved. Six of this group survived for 5 or more years. The lymph nodes were free of metastasis in 25 cases, and there were 17 patients (68%) who survived for 5 years. Of 93 traced patients who underwent operation 3 or more years ago, 41 had evidence of regional lymphatic metastasis. Of this number, 17 (41.4%) survived 3 or more years. Among the 52 patients without metastatic involvement of the regional lymph nodes, there were 41 (78.8%) who survived 3 or more years. Venous involvement was noted in 6 patients who underwent operation 2 or more years ago. All of them died within a 24 month period following operation.

Evaluation of the sphincteric function was made after review of the postoperative control in 137 patients. In 14 (10.3%) the result was excellent, in 58 (42.3%) control was good, in 34 (24.8%) it was fair, and in 31 (22.6%) the result was poor.

There is little pathologic evidence to support the contention that the external sphincter must be sacrificed in order to eradicate possible lymphatic extensions from carcinoma of the rectum located 3 cm. or more above the levator ani. Recent reports of the 5 year survival rates following abdominoperineal excision of carcinoma of the rectum with permanent abdominal colostomy range from 41.7 to 53.6 per cent. In the series of combined abdominoperineal excision

with preservation of the anal sphincter, the 3 year survival rate was 62.4 per cent and the 5 year survival rate was 51.1 per cent. Bacon and Vaughan reported 52.6 per cent of 5 year survivals following Bacon's sphincter-preserving operation. When the Miles procedure is employed in the presence of involved nodes, various authorities quote 26.2 to 37.5 per cent of 5 year survival rates. In the series herein reviewed, the 3 year survival rate was 41.4 per cent and the 5 year survival rate was 30 per cent when there was invasion of the lymph nodes.

In conclusion, the authors believe that the facts do not support the idea that the sphincter-preserving procedure is not a good "cancer operation" for carcinoma of the rectum situated 5 cm. or more above the pectinate line. Abdominoperineal excision with permanent abdominal colostomy should be utilized for lesions located within the distal 5 cm. of the rectum because of the greater possibility of direct metastasis and involvement of the internal anal sphincter.

—LeRoy J. Kleinsasser, M.D.

LIVER, GALLBLADDER, PANCREAS, AND SPLEEN

Wounds of the Liver; Review of 100 Cases. ROBERT S. SPARKMAN and MORRIS J. FOGELMAN. *Ann. Surg.*, 1954, 139: 690.

THE present study was undertaken in an effort to evaluate the treatment of liver wounds in the period following World War II. Material for the study consisted of 100 consecutive cases of liver injury admitted to one city-county general hospital. There was a case fatality rate of 10 per cent, and a morbidity rate of 44 per cent.

In known or suspected injuries of the liver, early operation is recommended to be preceded by adequate resuscitative measures. Approximately half the patients in the series exhibited shock on admission, and an average of 2½ pints of blood was given to each of 76 patients. Saline was also employed liberally, based on the premise that considerable loss of this fluid may be expected in chemical peritonitis. In half the cases active bleeding had stopped at the time of abdominal exploration.

Complications occur in rough proportion to the extent of hepatic damage. The highest incidence of fatality, therefore, is seen in nonpenetrating crush injuries or shotgun wounds, where fragmentation of the liver is most extensive. Stab wounds represent the least severe grades of tissue damage, and are associated with the lowest mortality and morbidity rates. Hemorrhage is the most common cause of death. Infection, necrosis, and biliary drainage account for the greatest number of nonfatal complications.

Small incised, penetrating, or perforating wounds usually heal regardless of the method of therapy. In sharp incised wounds closure by suture is the treatment of choice. Plugs of oxidized cellulose or gelatin sponge may be used when such wounds are bleeding actively. Satisfactory repair by suture may be accomplished in large liver tears, as well as in covering areas removed by débridement. If complete surface closure of a large hepatic defect results in the formation of a closed cavity, intrahepatic drainage is recommended. When there is extensive fragmentation and destruction of liver tissue, débridement and drainage should be performed.

Early intensive antibiotic therapy is desirable in all liver injuries in view of the probability of development of mixed infections. The agent most commonly employed was penicillin.

—Ely Elliott Lazarus, M.D.

A New Method for Hemostasis of the Liver: Phrenohepatopexy (Un nuovo metodo per l'emostasi del fegato: la freno-epato-pessia). FAUSTO LANZILLO. *Gior. ital. chir.*, 1954, 10: 389.

THE main problem in proper surgery of the liver is one of hemorrhage and hemostasis. The author reviews extensively the various methods that have been used to arrest hemorrhage from the liver, including the use of various solutions, tamponades, muscle grafts, special sutures, visceral approximation, and exteriorization of the bleeding surface. He cites a case in which unusual but successful hemostasis of the liver was secured.

The patient was a 10 year old child who was run over by a car; a wheel caused total compression of the right hypochondrium. No lacerations of the abdominal wall were present, but the child was in a state of shock which did not respond to the infusion of 200 c.c. of whole blood. An immediate laparotomy was performed under general anesthesia.

Massive hemoperitoneum was present and in this coagulum of blood was found a large fragment of liver, free in the peritoneal cavity. The liver was explored and the torn surface found to be bleeding freely. Its oozing lateral and superior wall measured 12 by 14 cm.

Various methods of hemostasis were attempted without success. It was then decided to suture the margins of the liver wound to the opposing inferior surface of the diaphragm. The posterior and superior surfaces of the wound were sutured first with interrupted sutures along the coronary ligament to the costal diaphragm. This was carried out to the anterior and inferior margins and the entire wound area was tightly approximated to the diaphragm with complete hemostasis.

The patient's condition gradually improved postoperatively and he was discharged on the twelfth postoperative day.

The author is of the opinion that since this method has produced such excellent results, it should be the procedure of choice when possible in surgery of the liver.

—Roland A. Manfredi, M.D.

Hepatic-Vein Pressure Studies for Evaluation of Intrahepatic Portal Hypertension. DONALD C. BALFOUR, JR., TELFER B. REYNOLDS, DAVID C. LEVINSON, WILLIAM P. MIKKELSEN, and ARTHUR C. PATTISON. *Arch. Surg.*, 1954, 68: 442.

WEDGE pressures of the hepatic vein were determined by passing a catheter through the arm vein, the right auricle, and the inferior vena cava into the hepatic vein, and wedging it into a radicle of the hepatic vein. Pressures were determined by means of a strain gauge.

The values for the wedge hepatic pressures vary between 3 and 9 mm. below the actual portal pressure.

All studies have demonstrated that in cirrhosis there is an elevation of pressure when the catheter is wedged into the hepatic vein and an abrupt fall when the catheter is drawn back into the free hepatic vein. There is no such pressure change in conditions such as hepatitis and extrahepatic block of the portal vein.

By utilizing this method it was found that in 5 cases of pregastroduodenal hepatic artery ligation performed during the preceding 4 to 18 months, the hepatic wedge pressure indicated a portal pressure just as high or higher than that measured at surgery. This would indicate that ligation of the hepatic artery does not lower the portal pressure, nor has this procedure appeared to benefit the patients more than medical management.—*LeRoy J. Kleinsasser, M.D.*

A New Method for the Determination of Gallbladder Function. LLOYD A. STIRRETT and ERIC T. YUHL. *Arch. Surg.*, 1954, 68: 417.

THE authors emphasize that the major limitations of oral cholecystography are (1) the time delay required to obtain roentgenograms, (2) the variable absorption of oral contrast substances, and (3) the inability to administer oral medication to those patients who are vomiting or require gastric suction. In these instances, a reliable, nontoxic, intravenous method of determining the function of the gallbladder is a useful diagnostic aid. The authors have utilized the results obtained with a new intravenous method for the determination of gallbladder function in a series of 102 patients. The method employs radioactive diiodofluorescein (DIF) as a tracer agent and the scintillation counter to detect the gamma radiation from the I^{131}. This is removed rapidly from the blood stream and is excreted in the bile. In preliminary experiments, it was observed that DIF appears in the bile within 10 minutes after intravenous injection and reaches a maximal concentration at 30 to 60 minutes thereafter.

The radiotracer method has been applied to a series of 102 patients. Twenty-six patients who had no clinical, roentgenographic, or surgical evidence of disease of the gallbladder or the biliary tract were studied as the control group. They underwent laparotomy for disease other than of the gallbladder or biliary tract, and oral cholecystograms before operation were interpreted as showing normal gallbladder function in each instance. The scintigram showed similar findings.

Fifty-five patients were found at operation to have chronic cholecystitis and cholelithiasis. Oral cholecystograms of these patients showed either failure to concentrate the contrast medium or the presence of calculi in all but 3 patients. In these 3 patients, the cholecystograms were interpreted as showing normal gallbladder function without evidence of calculi. The scintigrams of the 55 patients showed no concentration of the DIF in 35 patients. In 16 there was marked decrease in the concentration of the tracer agent and 4 showed apparent gallbladder function. The 55 patients suffered from chronic cholecystitis with cholelithiasis, 6 patients had chronic cholecystitis without calculi, 10 had acute cholecystitis, 2 had chronic pancreatitis, 2 had acute pancreatitis, and 1 patient had a large amebic abscess of the liver.

The results in this series indicate that scintography is a reliable index of the function of the gallbladder. The absence of undesirable side reactions is due to the small amount of the tracer agent required to perform the test, less than 2 per cent of the amount required for conventional intravenous methods. One limitation of this technique is the inability to visualize calculi. However, it has been observed that the presence of calculi within the gallbladder results, in most instances, in diminished or absent function of the gallbladder. —*LeRoy J. Kleinsasser, M.D.*

Contribution to Individualization of the Syndrome of Cysticitis (Contribution à l'individualisation du syndrome des cysticites). ANDRÉ-A. ARIANOFF. *Acta chir. belg.*, 1954, 53: 227.

IN 14 PATIENTS (with the exception of small areas of parietal atrophy) the gallbladder was normal and contained no stones, and yet a "hepatovesicular" syndrome was present. As a prolonged conservative treatment did not yield any results, surgical intervention was unavoidable.

The series consisted of 13 females and 1 male whose ages ranged from 21 to 64 years. The symptoms were those of biliary dyskinesia. In some patients painful crises simulating gallstone attacks dominated the picture while in others migraine and dyspepsia, alone or in combination with pains, were the chief complaints. With the exception of slight hypercholesterinemia or hyperbilirubinemia encountered in a few instances, the laboratory findings were negative. Cholecystograms showed 3 gallbladder types: (1) globular shape, (2) angulated organ, or (3) pseudo atony. A slow emptying of the gallbladder was recorded in all 3 types.

Cholecystectomy was performed in all 14 patients. The histologic examinations showed a normal gallbladder but marked changes in the cystic duct, namely, narrowing of its lumen, sclerosis of the stroma, plasmocytic infiltration, signs of hyperplasia, and even hyalinization. An excessive number of nerve fibers found in 4 cases suggests a functional origin of the condition. The histologic findings closely resembled those usually found in inflammatory lesions of the common duct and the sphincter of Oddi.

The author is of the opinion that cystitis, or inflammation of the cystic duct occurs more frequently than is generally believed, and that operative radiomanometric studies may aid in the recognition of this lesion which predisposes to the development of cholecystitis. —*Joseph K. Narat, M.D.*

Postcholecystectomy Symptoms from Cystic Duct Remnants. CHARLES BRUCE MORTON, II. *Ann. Surg.*, 1954, 139: 679.

THIS report supplements an earlier one and records a total series of 24 patients in whom a remnant of the cystic duct had been found at operation after a previous cholecystectomy. In 20 patients postcholecystectomy symptoms, including jaundice in several, were attributed to the remnant only. After surgical removal of the remnant, 20 patients were followed, one for as long as 14 years. Eighteen patients reported freedom from symptoms; 2 reported occasional trouble.

It seems reasonable to conclude that postcholecystectomy symptoms may be caused by a part of the cystic duct not removed with the gallbladder, that

surgical removal of the remnant will relieve the symptoms in those patients, and that surgeons performing a cholecystectomy should carefully remove the entire cystic duct with the gallbladder. It is, of course, all important not to damage the common bile duct as it tents up during traction upon the cystic duct.
—*Ely Elliott Lazarus, M.D.*

Operative Cholangiography (La nostra esperienza di colangiografia operatoria). GIUSEPPE D'ASTE and GIOVANNI SANQUIRICO. *Rass. ital. chir. med.*, 1954, 3: 1.

THE authors review the subject of operative cholangiography. Reich first used the method in 1918, followed by Cotti in 1929 and then by various other workers. However, the current method used was first used by Mirrizi in 1931, and he is considered to be the father of the method.

Ten case reports are given with illustrations. The authors prefer to inject the material through the cystic duct if possible and use 20 c.c. of a 70 per cent iodine solution. They conclude that the procedure is worth-while and safe. —*Lucian J. Fronduti, M.D.*

Operating Room Cholangiography; Errors in Technique and Interpretation. THOMAS C. DOUGLASS, R. BURNS LEWIS, and W. HARRISON MEHN. *Arch. Surg.*, 1954, 68: 422.

THIS is a report of the personal experiences of the authors during the past 5 years in taking 108 operating room cholangiograms in the course of 144 cholecystectomies. Cholangiograms were not taken in 36 patients for a variety of reasons; they were believed unnecessary in 30, dangerous in 4 because of the poor condition of the patient, and of no value in 2 because the duct could not be cannulated. Of the 30 patients for whom cholangiograms were believed unnecessary, 2 had a noncalculous gall bladder, 6 had one or two large stones with hydrops, 4 had hydrops with a small common duct, 15 had a small common and cystic duct, 2 had common duct exploration, and 1 patient had small calculi. Technical errors occurred in 17 patients; they consisted of motion, duodenal injection, air in the ducts, poor filling, rapid emptying, leak about the cannula, mechanical failure, and interposition.

Difficulties in interpretation were encountered in 20 patients. Translucent areas believed to be air appeared in the common duct in 11 of the cases and were the most serious of the defects noted. Most of these defects were believed to be due to air injected with the radiopaque medium. This occurrence has been minimized by the use of a fine polyethylene tube inserted into the cystic duct before division, instead of a larger catheter or cannula. Care is also necessary in eliminating air from the syringe and tubing.

Failure of the common duct to empty into the duodenum occurred in 9 of the cases from other causes than stones. Such a finding is presumptive evidence of block by stone, pancreatitis, edema, spasm, or tumor. No stones were found in these 9 cases and it was thought that the cause was spasm of the sphincter. Therefore, the preoperative use of barbiturates is recommended. This has been further aided by relaxation of the sphincter following the injection of a mixture of 10 c.c. of 1 per cent procaine hydrochloride and 20 c.c. of iodopyracet for a subsequent roentgenogram. If this method fails the duct must be explored. In 3 of 108 cholecystectomies in which operative cholangiography was used, stones were overlooked. The authors also emphasize the necessity of repeating cholangiograms postoperatively.—*LeRoy J. Kleinsasser, M.D.*

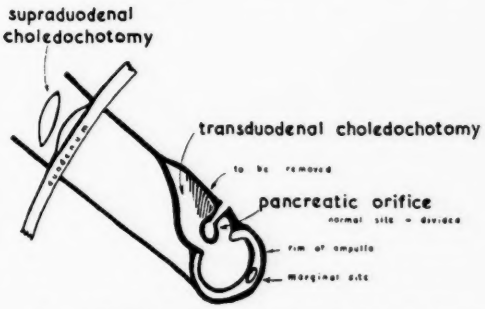

FIG. 1 (Starr). Operative plan for division of stricture of pancreatic orifice.

Recurrent Choledocholithiasis and Obstructive and Pancreatic Problems after Choledochotomy. KENNETH W. STARR. *Austral. N. Zealand J. Surg.*, 1954, 23: 206.

A REVIEW of 384 cases requiring biliary surgery prior to 1947 is presented along with 260 cases treated in the years 1947 to 1952. An attempt was made to correct unsatisfactory sequelae that occurred in the first series of cases.

In the first series of 384 cases, 92 choledochotomies were performed. The usual choledochotomy was done and a T-tube drain or catheter was inserted in the common duct. It was evident that tubal drainage was an imperfect solution to the problem of curing disease states of the common bile duct because drainage difficulties, recurrence of obstructive jaundice, and the persistence of pancreatic pain accounted for certain unsatisfactory results. The difficulties of tubal drainage were obvious in that 5 postoperative cases of obstructive jaundice were encountered in which removal of the tube resulted in a rapid resolution of the jaundice. Two cases of irremovable T-tubes were encountered, which required a difficult laparotomy with wide ductal exposure for the removal. Another instance of prolonged obstructive jaundice occurred which was due to multiple duct stones. A stricture of the duct at the site of the tubal drainage was included in the series, and although such cases are not as formidable as complete severance, they are very unpleasant and of uncertain prognosis. Of 15 patients requiring further laparotomy for obstructive jaundice, 5 were found to have stones in the common duct.

The recurrence of obstructive jaundice in these cases occurred in three ways:

First, painful obstructive jaundice, the features being indistinguishable from the impacted stone in the common bile duct. There were 7 cases, and in 3 stones were found. The second recurrence was of the quiet, painless type with jaundice suggesting neoplastic ob-

struction, of which there were 4 cases. One of these patients presented a large number of stones in the duct at the original operation, despite the absence of stones in the gallbladder, and a similar state at the second operation. The third recurrence was a subclinical jaundice with occasional bouts of biliuria and persistently high blood bilirubin. There were also 4 cases in this group.

The findings at these operations are well known: there are stones in the duct or gallbladder, or both, or neither; the duct may be inflamed, dilated, or normal in size. All of these cases manifested one common sign. The ampullary end of the common bile duct was indurated and inelastic when the ductal dilator was passed. In some, the fibrous state had also involved a portion of the head of the pancreas.

In the second series of cases, an attempt was made to perform choledochotomy without external biliary drainage and to obviate the recurrence of ampullary obstruction by division of the strictured area or by short-circuiting the bile, or both. Choledochotomy was required in 66 cases, and to these cases the principle of internal biliary drainage was applied. If the sphincter was yielding and elastic, a closure of the common bile duct after choledochotomy and ampullary dilatation was done. If, on the other hand, the sphincter region was indurated or inelastic, the induration spread into the pancreatic head when palpated over the probe, or if the pancreatic features were prominent in the history, then internal biliary drainage was provided. The three methods of internal biliary drainage that were available were a transduodenal choledochotomy (sphincterotomy), a short circuit by choledochoduodenostomy, or both combined. There were 10 transduodenal choledochotomies, 44 choledochoduodenostomies, and 6 cases in which both methods were used. The fact that none of the patients have required subsequent laparotomy for obstructive jaundice indicated that the fistula remained open as required, or that the sphincteric induration had to some degree resolved.

The pancreatic problems concerned 22 cases which fell into two groups. The first group, 12 cases, were mainly older patients who suffered mild symptoms which improved on the administration of pancreatic extract. The second group, 10 cases, were predominantly younger individuals who suffered severe subacute recurrent pancreatitis. Complete resolution in this group was rare, and any prospect of relief afforded this type of patient usually was quickly and readily agreed upon by the patient. When fibrosis of the ampullary end of the common duct was responsible for the recurrence of obstructive jaundice, it was surmised that in some cases a similar state would account for associated severe pancreatic symptoms. With this assumption investigation was undertaken of the orifice of the pancreatic duct. Upon division of the stricture of the orifice, which provided free internal drainage of the bile, dramatic relief resulted in 1 case, which prompted repetition of the operation in 9 other cases.

It is suggested that when a division of a stricture of the pancreatic orifice is being done, care should be taken that excessive opening of the ampullary duct is avoided as severe brisk arterial hemorrhage may occur. It is also easy to fail to open the ampulla itself. The distal duct may be opened and the rim of the ampulla left intact. In this event a marginal opening of the pancreatic duct may be missed. The duct is usually found (in 85 per cent of the cases) about 5 to 15 mm. up the left face of the ampullary bile duct (Fig. 1). In 11 per cent of the cases a marginal site for the pancreatic duct is visible. Hemorrhage may be a very annoying complication.

When cutting the pancreatic duct, the blade of a fine knife is passed into the duct and the distal 1 cm. of the duct is divided. This will allow a larger probe to pass gently for 5 to 7 inches up the duct. Any pancreatic tissue between the open pancreatic and common bile ducts should be removed, so that the ducts will have unimpeded drainage into the duodenum. The dramatic and continued improvement in the cases in which the suggested procedures of establishing adequate free internal biliary drainage and pancreatic drainage were done when indicated is very impressive.

In 1938 Lahey suggested that we had entered the third stage of surgery for biliary stones. In the first stage, stones were removed by cholecystotomy, in the second stage removal was effected by cholecystectomy, and in the third stage stones were sought and removed from the entire biliary tree. The author has suggested that it was not too extravagant to suggest that the fourth stage now consists in tackling the problems arising from associated biliary and pancreatic disease. This could lead us to the fifth stage in which we know the cause of gallstones. —*John E. Karabin, M.D.*

A Review of 500 Biliary Tract Operations. WILBUR E. FLANNERY. *Am. J. Surg.*, 1954, 87: 754.

THE records of 500 patients who were subjected to biliary tract surgery performed between January 7, 1943 and January 8, 1952 are reviewed. The age and sex incidence, the variety of operations, the number of postoperative days the patients spent in the hospital, and the number of deaths are noted. The pathologic and x-ray reports are presented and the postoperative complications are reviewed. The responses to questionnaires returned from 60.7 per cent of the patients are analyzed. A comparison of some of the author's findings is made with those of a few other workers who had reviewed more or less similar instances of biliary tract surgery.

—*John J. Maloney, M.D.*

The Treatment of Recurring Acute Pancreatitis by Decompression of the Biliary Tract. EDGAR J. POTH and FRED J. WOLMA. *Am. Surgeon*, 1954, 20: 270.

THE authors present a series of 11 cases of recurrent acute pancreatitis treated by continuous internal drainage and decompression of the biliary tract. The rationale of this method is the attempt to restore normal hydrodynamics in the combined duct systems of the liver and pancreas and thus to prevent reflux of bile into the pancreatic ducts. The normal physiologic mechanisms and pressures in these ductal systems are reviewed.

Internal drainage of the biliary tract was achieved by utilizing the Roux-en-Y principle. A long defunctionalized jejunal limb is anastomosed to the gallbladder or common duct as applicable in each case. The

authors believe the procedure of choice is an end-to-side choledochojejunostomy without division of the common duct. Two advantages of this procedure are that the common duct is not encircled by the anastomosing suture and that pancreatic secretions can reflow up the proximal segment of the common duct to enter the jejunum should the ampullary opening become occluded.

There were no frank failures following the method advocated by the authors; however, the long term results are not known as the follow-up period has been short. —*Thomas Shields, M.D.*

Ethionine in the Treatment of Cancer of the Pancreas; Preliminary Report (L'éthionine dans le traitement du cancer du pancréas: premier essai). G. GUALANDI and A. BERGAMINI. *Arch. mal. app. digest.*, Par., 1954, 43: 305.

THE administration of the amino acid ethionine (S-ethylhomocystein) in large doses to rats causes pancreatic necrosis. When small doses are given over a long period of time, pancreatic fibrosis occurs. Other toxic effects are fatty infiltration of the liver and damage to the renal tubules. Ethionine has also been shown to exert an inhibitory effect on the growth of a transplantable rat sarcoma. For these reasons it was used to treat a 39 year old patient with carcinoma of the head of the pancreas.

The presenting symptom in this patient was jaundice gradually increasing over a 3 month period. At laparotomy, a cholecystoduodenostomy was done and the diagnosis of carcinoma of the head of the pancreas was confirmed. Following this procedure the icterus was relieved, but it returned 1 month later. The patient was then given 300 mgm. of ethionine daily. This was increased to 600 mgm. and later to 1 gm. per day. The total dose was 15.9 gm. A diet low in methionine was given concurrently. This dose was well tolerated and the patient seemed to improve during the treatment.

There was a drop in the blood sugar from an initial value of 119 to 86 mgm. per cent. Other laboratory studies including liver function tests, and the blood protein and fat levels remained unchanged during the course of treatment.

The patient died 9 months later from cancer of the pancreas, having received little, if any, benefit from the treatment. —*Frederick W. Preston, M.D.*

The Present Status of Surgery for Carcinoma of the Head of the Pancreas (Über den derzeitigen Stand der Chirurgie des Pankreaskopfcarcinoms). F. SPATH and W. KÖLE. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 272.

A REVIEW of carcinoma of the pancreas with reference to frequency, symptomatology, differential diagnosis, and histology, based on 51 personal cases seen between 1944 and 1953 is presented. Seventy per cent of the carcinomas (36 tumors) were located in the head of the pancreas. Only 3 of these 36 tumors were operable, a fact which emphasizes their tendency to rapid growth and early metastasis. The duration of symptoms before arrival at the clinic in this series averaged 5 months, the shortest period being 3 weeks and the longest, 2 years.

Earlier diagnosis and a better operability rate depend primarily on familiarity with the symptomatology. The earlier teaching that a painless icterus is typical of carcinoma of the head of the pancreas is incorrect and should be revised. Icterus as an initial symptom is rare and may never appear in some 25 per cent of patients. Icterus, when it does appear, is not necessarily constant but may occur in either painless or painful intermittent episodes. In more than two-thirds of patients the earliest symptom is indefinite, intermittent pressing or boring pain in the upper abdomen, most often localized in the right upper and mid-abdomen and rarely in the left upper abdomen. The pain is usually more severe at night. Other gastro-intestinal symptoms of tumor appear early, such as loss of appetite and weight; nausea, retching and vomiting; diarrhea, obstipation, and anemia. Laboratory determinations of blood sugar and pancreatic ferment values may assist in making an early diagnosis. The serum lipase is often sharply increased, and a majority of patients show anacidity or hypacidity.

In the surgical management of carcinoma of the head of the pancreas, where a radical operation could no longer be done, cholecystogastrostomy was most frequently used for palliation. Gastroenterostomy was added when necessary because of stenosis. Cholecystoduodenostomy and choledochoduodenostomy have been avoided recently because of the tendency toward tumor invasion of the anastomotic site. Antecolic cholecystojejunostomy and choledochojejunostomy were done in a few cases. Hepaticoduodenostomy was carried out once. Palliative procedures are of value as far as icterus is concerned but the operative mortality is high and the average survival period is not very long. In a tabulation of a series of 338 palliative biliodigestive anastomoses collected from various authors, there is an immediate mortality of 41 per cent and an average duration of life of 9.3 months for those surviving operation.

The evolution of duodenopancreatectomy is reviewed and the immediate and late results of 235 collected operations are tabulated. The tabulation shows an over-all operative mortality of 26 per cent and a 2 year survival of 30 per cent. The table shows that the one-stage procedure is being employed more frequently than the two-stage operation in recent years and that the operative mortality is diminishing. In comparison with the mortality and late results for palliative procedures, the figures for radical pancreaticoduodenectomy are encouraging and point toward further improvement through earlier diagnosis and early laparotomy. —*John L. Lindquist, M.D.*

One-Stage Pancreatoduodenectomy with Resection of the Superior Mesenteric Vein. GEORGE E. MOORE and BARBARA URE. *Surgery*, 1954, 35: 734.

THE authors briefly review the cases of ampullary and pancreatic carcinoma seen at the University of Minnesota hospitals between 1936 and 1951. In only 15.4 per cent of the patients was a curative procedure attempted and included in these procedures were many extremely aggressive ones. It is difficult to provide effective palliation for this tumor. Certainly, the patient and relatives are relieved to see the disappearance of jaundice and its attendant discomfort. This can

be most simply provided by insertion of a T tube, but this technique has the disadvantages of loss of electrolytes and water, and the problem of continual external drainage. The authors prefer, if choledochojejunostomy is impossible, to insert an enterostomy tube also, which can be connected to the T tube externally and allows the bile to be returned to the intestine. The enterostomy tube can, of course, also be used for feeding purposes. Although choledochojejunostomy is increasingly popular, the authors' experience does not indicate that it offers an increased period of palliation. Both the loop of jejunum and the Roux Y principle have been utilized, with little difference clinically. Finally, it should be noted that radical pancreaticoduodenectomy is not a satisfactory palliative procedure and should be used only when there is a possibility of effecting a curative excision.

The authors report 3 cases including 1 previously reported in which a segment of the superior mesenteric vein was resected. In 2 patients the vein was reanastomosed to itself and in the third case it was anastomosed to the vena cava. Two of the patients lived for only a few weeks after the operative procedure, but autopsy examination revealed a patent superior mesenteric vein.

In 1 patient the superior mesenteric vessels were clamped for 95 minutes. The threat of mesenteric thrombosis following prolonged clamping of the superior mesenteric vessels for intervals necessary to complete a block dissection of the pancreas and reanastomosis of the vessels cannot be disregarded. Fortunately, no such catastrophe was encountered in the 3 cases reported. Undoubtedly, the fact that most patients with carcinoma of the pancreas have an obstructed biliary tract and some depression of liver function increases the margin of safety. The authors state that it is imperative that the accompanying superior mesenteric artery be occluded simultaneously or preferably a few seconds earlier than the superior mesenteric vein is occluded. This prevents engorgement of the portal system during the surgical treatment. —*Earl O. Latimer, M.D.*

Changes in the Spleen Secondary to Pancreatic Disease (Le retentissement splénique des affections pancréatiques). LUCIEN LEGER, PAUL LAJOUANINE, ANDRÉ CORNET, and JACQUES ARNAVIELHE. Presse méd., 1954, 62: 666.

SPLENOMEGALY is present in 12 to 25 per cent of the patients with cancer of the body or the tail of the pancreas. Often there is obstruction of the splenic or portal vein in this disease. Splenoportography by a technique of injection of opaque media into the spleen is useful in demonstrating the changes. Four cases of cancer of the pancreas are cited in which splenoportography was used to demonstrate obliteration of the venous channels, thus aiding in establishing the correct diagnosis.

In rare instances thrombosis of the splenic vein may lead to portal hypertension localized to a portion of the portal system. A case is cited in which localized portal hypertension on this basis caused bleeding from the lower part of the gastrointestinal tract. Obliteration of the splenic vein was established by splenoportography in this patient and later confirmed by a portovenogram done at the time of surgery. The underlying cause for the disorder in this case was chronic pancreatitis and pancreatic lithiasis. Portal hypertension, diffuse or localized, should be kept in mind as a diagnostic possibility in a patient bleeding into the gastrointestinal tract. Two cases are cited in which malignant tumors were present in the tail and body of the pancreas. Splenic vein thrombosis led to localized portal hypertension manifested by bleeding into the gastrointestinal tract in both patients. These patients now are in satisfactory health approximately 19 months after splenectomy and left hemipancreatectomy.

Splenoportography is useful in estimating the operability of pancreatic lesions. Preoperatively, a splenoportogram may indicate that extensive obliteration of the venous channels exists. This suggests that the lesion is extensive and therefore may be inoperable. Portal venography accomplished at the operating table may be used to outline the venous channels in the liver and thus indicate whether or not deep-seated hepatic metastases are present.

—*Frederick W. Preston, M.D.*

MISCELLANEOUS

Wounds of the Abdomen; Observations of 102 Cases (Sur les plaies de l'abdomen; d'après 102 observations). GEORGES OLIVIER. *Lille chir.*, 1954, 9: 89.

THIS is a report of 102 wounds of the abdomen treated by the author in Indo-China in the period from 1947 to 1950. Most of the wounds were caused by projectiles. Most of the wounded were native civilians.

Twenty-three of the 102 patients were not operated upon because of their poor condition, the time interval between the wound and admission to the hospital, or because the wound appeared to be minor. The seriously wounded who did not respond to treatment for shock were not operated upon. There were 10 such patients and all of them died. Thirteen patients survived without operation In 10, the wounds were minor and in 3 a time interval of 72 hours or more had elapsed before they entered the hospital.

Of those operated upon, 47 died within 6 hours after operation. Many of these patients were operated upon without adequate treatment for shock, and many times blood for adequate replacement was not available. In 9 instances antopsies revealed overlooked visceral lesions, and in some of these patients the critical condition of the patient had not permitted adequate exploration. Another cause of postoperative death was hemorrhage which originally had been controlled but had recurred postoperatively. There were 2 deaths due to bleeding from the external iliac artery and 2, from the hypogastric artery. Postoperative hemorrhage is very difficult to diagnose.

The mortality of the patients operated on was 54 per cent. The lowest mortality occurred in the group operated on within 2 hours after the injury. There were many transfusion reactions which often nullified the benefit from the transfusions. The mortality was 52 per cent for patients who did not receive transfusions and 63 per cent for those who received them.

The administration of anesthetics by a trained anesthetist using a closed circuit has done much to

improve the results of abdominal surgery for trauma. However, neither trained anesthetist nor a closed circuit apparatus was available to the author.

—Frederick W. Preston, M.D.

Permanent Supraelevations of the Diaphragm (Le sopraelevazioni permanenti del muscolo diaframma). EDMONDO REGGIANI. *Arch. mal. app. diger.*, 1954, 20: 81.

THE author reviews the subject of permanent elevation of the diaphragm. He discusses 2 personal cases. In general, therapy is medical for the patients with mild symptoms and surgery is reserved for those with progressive symptoms which gravely compromise either the thoracic or abdominal organs.

—Lucian J. Fronduti, M.D.

Massive Retroperitoneal Tumors in Children. Wilms's Tumor and Neuroblastoma Sympatheticum. E. K. AHVENAINEN, K. MALMIO, and M. SULAMAA. *Ann. chir. gyn. fenn.*, 1954, 43: 1.

IN THE light of recent developments in the management of massive retroperitoneal tumors in children, the authors have made an extensive survey and analysis of all cases seen at the Children's Clinic and the Central Institute of Radiotherapy in Helsinki, Finland during the period from 1947 through 1952. This series represents the majority of proved cases seen in Finland during that interval of time.

Fifty-six cases were studied. Of these, 25 were Wilms's tumors, 17 sympathetic neuroblastomas, 8 unidentified malignant tumors, and 6 benign tumors. The incidence of these lesions in children is not very high, although it represents a considerable proportion of all malignant tumors found in childhood.

Abdominal enlargement or the incidental finding of a tumor apparently without symptoms led to hospitalization in 60 per cent of the cases of both malignant and benign renal tumors. Only 30 per cent of the patients sought medical care because of systemic disturbances. In less than 10 per cent of the patients pain, hematuria, or trauma brought the examiner's attention to the lesion.

Procrastination on the part of the patient apparently played only a small role in the rather dismal picture of the stage at which the malignant group of these lesions were brought to the attention of the physician. Only one-fifth of the patients had symptoms for more than 2 months. Despite this, however, operative intervention was abandoned because of metastases or cachexia in 15 of the 56 cases and exploration revealed the incurability of another 16 cases. This group of patients included the majority of cases of unidentified malignant tumor, all the neuroblastomas, 6 of the Wilms's tumors, and 1 teratoma of the renal area. The latter, although classified histologically as benign, was clinically an infiltrating lesion. Thus, radical operation was possible in only one-fifth of the patients with malignant tumors.

The clinical diagnosis of this group of lesions is primarily made by palpation. Specific diagnoses within the group are made with some difficulty. In the authors' series, patients with neuroblastoma often presented systemic symptoms at a relatively early stage of the disease in contradistinction to patients with Wilms's tumor. Fever was noted in connection with both tumors. The distribution of Wilms's tumor revealed no difference with regard to the sex of the patient, whereas sympathetic neuroblastoma was more frequent in girls. In both lesions, the distribution with regard to the side of the body involved was equal. A third of the patients with Wilms's tumor and almost half of those with sympathetic neuroblastoma were admitted for treatment at an age under 2 years. The differential diagnosis between retroperitoneal and intraperitoneal tumors was not always immediately clear. However, in most cases, scout films, excretory and retrograde urography, as well as barium enema studies allowed differentiation of the two groups of lesions. Chest films and bone survey studies for metastases were considered most important in deciding the course of therapy as well as in managing the patient during the follow-up period.

Radical operative intervention is the only treatment which offers a chance of permanent recovery in the malignant group of retroperitoneal tumors. Although these tumors are very sensitive to irradiation in most cases, this mode of treatment will not completely destroy all the tumor tissue. On the other hand, the use of irradiation in the management of localized metastases may be very valuable if the primary lesion has been removed. While the author is favorably inclined toward the use of preoperative x-ray therapy, he makes it quite clear that none of his observations support the view that a tumor in a primarily inoperable condition can be made operable through irradiation. The reduction in the size of a Wilms's tumor by this means not only facilitates its removal through the transabdominal route but also permits greater accessibility of the renal pedicle, a factor which is considered to be of considerable importance in preventing metastases which occur through the renal vein during the operation. In the 5 cases in the authors' series of neuroblastoma with preoperative radiation, no significant reduction in size of the tumor mass was noted. Postoperative irradiation was done on the operative field in both groups by the same technique and in similar dosage as was used preoperatively. From a review of the pathological material, it was clear that radiotherapy alone which had been administered preoperatively was not sufficient to destroy all the tumor tissue in even a single case.

Of the 25 cases of Wilms's tumor, 19 were operable although only 10 were radically resectable. In 6 of the last 10 cases the patients were still alive, only 4 having survived more than 1 year. Preoperative x-ray treatment seemed to influence the survival rate favorably in this group. By way of comparison, Gross, who does not use x-ray therapy, has reported 32 survivals for over 2 years among 96 cases of Wilms's tumor.

Not a single case of the 17 neuroblastomas in the author's series was resectable. The author has commented that probably because of the far advanced nature of his cases, the outlook was less favorable than usual. By comparison, among 32 patients, Ladd and Gross had 7 permanent recoveries. Wittenborg reported a 33 per cent 3 year total recovery rate in a

group of 55 patients. Further, among a group of 16 patients treated only by irradiation, he had 6 recoveries.

At present, the possibility of improving radiotherapeutic technique in the preoperative and postoperative management of these cases offers the only encouragement for the reduction in the mortality of a disease which presents such a dismal outlook in general and from the surgical point of view in particular. —*Harvey N. Lippman, M.D.*

Temporary Aortic Occlusion in Abdominal Surgery. B. H. Burch, D. W. Traphagen, M. J. Folkman, D. A. Rosenbaum, and E. C. Mueller. *Surgery*, 1954, 35: 684.

During the past year the authors have been interested in the use of aortic occlusion to facilitate surgical procedures within the abdomen, and suggest its trial in uncontrollable hemorrhage. Since all of the viscera within the abdomen ultimately receive their blood supply from the aorta, it would appear that even the most profuse hemorrhage could be controlled by aortic occlusion above the celiac level. In a previous report, aortic and portal occlusion as a method of obtaining hemostasis was presented. Temporary occlusion just above the bifurcation of the aorta for 1 hour to ease pelvic evisceration with minimal bleeding was done without any complications.

Except for otherwise fatal conditions (aneurysms, emboli), the use of occlusion of the abdominal aorta has received little attention. In this study, 114 dogs were used to determine (1) at what levels the abdominal aorta could be safely occluded, (2) the effects on the cardiorespiratory system (series 2), (3) the effects on the blood electrolytes (series 3), and (4) the physical and chemical means by which survival could be assured. In the latter three phases of the problem this study was restricted to the celiac level for lethal periods of occlusion. Autopsy and microscopic sections were taken of each animal upon sacrifice or death.

A Potts coarctation clamp was applied for varying lengths of time. It was determined that the maximum safe time for aortic occlusion just above the celiac axis is 20 minutes; above the superior mesenteric artery, 60 minutes; above the renal arteries, 60 minutes; and above the inferior mesenteric artery, 3 hours (60 dogs).

The mortality rate of ligation and division of the aorta just above and just below the inferior mesenteric artery is 100 per cent and 40 per cent, respectively (10 dogs). Following lethal occlusion of the aorta above the celiac axis, the carotid blood pressure does not return to normal and continues to decline until death (5 dogs). There is a progressive rise of celiac, renal, and carotid arterial pressures when occlusion of the aorta approaches these vessels from below, and a prompt fall in pressure occurs when the occlusion site is above them (3 dogs).

Cooling of the liver (10 to 20 degrees C.) allowed 60 minutes of occlusion above the celiac axis without fatalities (9 dogs). Dibenzyline and alloxan appear to exert protection from the effects of occlusion above the celiac axis; aureomycin and vitamin E did not offer lasting benefit in the doses which were employed (22 dogs).

The liver and kidneys appear to exert a dominant role in determining the outcome following aortic occlusion. Microscopic evidence of focal liver necrosis and renal tubular damage occurs in lethal occlusions above the celiac axis (all dogs). Blood chemistries just before death in fatal aortic occlusions above the celiac axis were not of sufficient magnitude to account for the deaths (5 dogs).

It is to be noted that the exact mechanism of death following aortic occlusion above the celiac axis is unknown. There is evidence that the liver and kidneys exert the predominant role in the outcome following aortic occlusion and that hypotension results from prolonged aortic occlusion above the celiac axis.

—*John H. Mohardt, M.D.*

GYNECOLOGY

UTERUS

Carcinoma of the Body of the Uterus. W. G. Cosbie, W. Anderson, O. B. Millar, and M. L. Bunker. *Am. J. Obst. Gyn.*, 1954, 67: 1014.

The authors present 421 cases of carcinoma of the corpus uteri observed during the period from 1937 to 1952. Their experience coincides with the generally held concept of the increased incidence of diabetes, obesity, hypertension, and delayed menopause in patients with carcinoma of the corpus. Although they currently use a planned preoperative treatment with radium placed in the cavity and followed by a panhysterectomy, only a part of this series of cases was so treated.

The radiation is given by either tandem pairs or by multiple applicators, depending on the size of the cavity. Both 3 and 5 year survival rates are presented with a breakdown of figures for treatment by the various modalities mentioned and combinations thereof. The greatest survival rate was seen among patients who had preoperative radiation and surgery.

The authors stress the need for a definitive pathological diagnosis of carcinoma as distinguished from atypical endometrial hyperplasia, in a study of this kind. Finally, they point out the marked influence on the survival rate of the finding of postradiation residual carcinoma in the surgically removed uterus.

—Henry C. Falk, M.D.

Experiences with the Manchester Operation After Burger's Technique (Erfahrungen mit der Manchester-Operation nach Burgers Technik). Th. Berwind. *Geburtsh. & Frauenh.*, 1954, 14: 424.

Burger, who is Director of the University Women's Clinic in Wuerzburg, was trained in the Manchester operation 25 years ago, in Anglo-Saxon countries, and has since modified the technique. Nearly always after premedication, local anesthesia is used with its additional hemostatic factor (epinephrine). The technique, which is described in detail with good drawings, differs from the routine type (e.g., as described in Te Linde's *Operative Gynecology*, 2nd edition, 1935) in the following details:

The cystocele is taken care of with interrupted or purse-string sutures before the cervix is circumcised, and the excess mucosa is often trimmed at this time to avoid open wounds. Special care is exercised to close the "weak spot" in Ward's uteropubic fascial plane. Burger believes that fibrous tissue, the uterine vessels, and broad ligaments can be ligated en masse with a little bite of cervical tissue. Postoperative scarring and the resulting shortening of the parametrium will further lift the uterus and make the anterior approximation and fixation of the broad ligaments unnecessary. On closing the anterior vaginal mucosa, mattress sutures are used towards the urethral opening, and two special sutures towards the amputated cervix. These should include the bladder pillars and the cervical wall.

The author reports 210 cases in which operations with this method were performed in Wuerzburg since 1947. During the same period, 608 other vaginal plastic operations were done for descensus, but no laparotomies. Burger uses total vaginal hysterectomy (Mayo type) in cases of prolapse only if other uterine disease is coexistent. Even total prolapse is approached with this method, but only by more experienced surgeons. Among the 210 cases, there were 26 patients with total prolapse, 93 with subtotal prolapse, and 91 with severe descensus uteri and vaginae. Twenty-three patients had a recurrent prolapse and the majority of these were not reoperated upon at the author's clinic. There were only 3 recurrences and 4 moderately large cystorectoceles. There was no mortality in this series of cases and very little morbidity.

—W. D. Bergmann, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Contribution to the Question of Hysterosalpingography in Female Sterility with an Evaluation of the Clinical Results (Beitrag zur Frage der Hysterosalpingographie bei der weiblichen Sterilitaet unter Auswertung klinischer Ergebnisse). H. Zeitz. *Geburtsh. & Frauenh.*, 1954, 14: 533.

The author presents 401 cases of female sterility in which hysterosalpingography was used when all other clinical methods had failed to reveal the cause of the condition. The test was employed only in cases of possible malformation or closure of the fallopian tubes, including peritubal adhesions, when a primary or secondary infertility of 2 years' standing had been proved. The test was never done in tumor diagnosis, in bleeding of long standing, or in the presence of inflammatory processes. In order to avoid ascending infection and the dissemination of metastases forceful opening of the closed tubes was never attempted. The author observed, however, that mild pressure very often has the useful physiologic-therapeutic effect of reactive hyperemia, stimulation of the uterine musculature, and tubal peristalsis—and, possibly, a provocation of ovulation.

Since the tubes are ready to receive an ovum at this time, the most favorable time for the procedure was thought to be from the twelfth to fifteenth day after onset of the period. A 40 per cent iodipin-oil solution was used as a contrast medium and only 4 films were taken in order to restrict the total radiation dose to the ovaries to somewhere below 3 roentgens.

As the test was done only on strict indications, with the smallest amount of oil necessary, and with little pressure, no complications were encountered except in 2 cases of mild pelvioperitonitic irritation. The density of the oil as compared to the newer water soluble substances was welcome since little value was placed on exact outlines of the mucosa, the demonstration of small polyps and other details. The trapping of oil in a closed tube for long periods with possible formation of foreign-body granulomas was not considered a serious

disadvantage since most of these patients needed surgery anyway.

Sixty-four per cent of the 401 cases of sterility considered in this report were due to closed tubes (80 per cent in the ampullar section); in two-thirds of these, closure was bilateral. Only in 17 per cent did uterine sterility occur in women with normal tubes; in 45 of these the sterility was due to infantilism and hypoplasia and in 22, to malformation. The remaining 19 per cent could not be explained roentgenographically.

Pregnancy within 6 months (the criterion of therapeutic success) occurred in 61 cases (26.7 per cent). Of these patients, 19 conceived with one patent tube, 14 with uterine pathologic changes only.

—*W. D. Bergman, M.D.*

Fibroma of the Ovary with Ascites and Hydrothorax —Meigs' Syndrome. Joe Vincent Meigs. *Am. J. Obst. Gyn.*, 1954, 67: 962.

This article deals with 84 cases of the syndrome bearing the author's name, which were collected from the world literature. Although cases were reported much earlier, the syndrome was not clarified until 1937. By definition, the syndrome consists of a benign solid ovarian tumor accompanied by both ascites and hydrothorax. These effusions must disappear permanently with removal of the tumor. The tumors are usually fibromas but may be thecomas or granulosa cell tumors. Both benign and malignant ovarian cysts as well as pancreatic disease may present a similar picture. There is no correlation between the size of the tumor and the quantity of effusion. Abdominal swelling and pain associated with dyspnea and leg edema are the characteristic symptoms. The pleural fluid is more commonly on the right side, but it may be on either side or both sides. Symptoms of pulmonary parenchymal disease are rare. Laboratory study of the fluid is of little significance. It is a transudate which shows no tumor cells.

The authors discuss the many theories as to the etiology of the effusion, but accept none as being accurate. It has been established that the ascitic fluid is transported to the chest.

Treatment consists of surgical removal of the tumor. Finally, all 84 cases are presented in tabular form.

—*Henry C. Falk, M.D.*

EXTERNAL GENITALIA

Observations and Considerations with Reference to Some Findings of Vaginal Cytology During the Period of Senility (Osservazioni e considerazioni su alcuni reperti de citologia vaginale nelle donne in età senile). Piero Sora. *Minerva gin.*, Tor., 1954, 6: 20.

The vaginal smear findings considered here are classified into three principal groups, in accordance with the classification proposed by Papanicoloau and Traut in 1943. The author's material consisted of vaginal smear examinations on women over 65 years of age and without known malignancy of the vagina or of the uterus. By this classification, 40 per cent of the women were of the atrophic menopausal type, 36.7 per cent of women were of the full menopausal type, and 13.3 per cent of women were the premenstrual menopausal type. Evidence of strong estrogenic stimulation was present in 3.3 per cent, and hyperkeratosis in 6.7 per cent of the women.

In the majority of smears studied, there was evidence of a certain amount of glycogen within the cells. Even in the first group (atrophic type) the oval and rounded cells assumed the orange color of Bauer's stain, though less vividly and uniformly distributed than in the other types. The presence of glycogen in these aged patients is hardly to be ascribed to ovarian activity, and is related to the activity of the suprarenals in the guise of steroid hormones of mild folliculoid activity. In fact, the author believes there is an inherent glycogenopexic property in all epithelial cells and that the steroids act by indirectly stimulating these aging cells to such activity.

In addition to the cells described as characteristic for the three types, there were found in some instances giant multinuclear cells such as those described by Sani (*Ann. Ost. e Gin.*, 1950, 77: 5, 562) as "plasmodi" from the cells of the bladder, in the urine of women in the last 3 months of pregnancy. However, the author does not think that the finding of these cells could be the result of hormone disturbances; he ascribes their presence to a simple process of "endoamitosis catabiotica" as has been described in senescent cells by Pensa (*Istologia Generale*, S. E. L., Milano, 1939), usually indicating the immediate death of the cell (agonal manifestation).

In a number of instances there were present polymorphic cells in compact groups which evidenced anisocytosis, anisonucleosis, intense basophilic staining of the cytoplasm, and also the disposition of the chromatin in irregular masses. The evident hyperchromatism of the nuclei would arouse a certain concern with regard to malignancy; however, these patients, following their period of treatment in the clinic, have in no instance returned for further treatment and check-up, and this seems to rule out the possibility of malignancy in most instances. The author attributes these peculiar cellular complexes to the presence of a chronic, mild form of vaginitis or endometritis, or both.—*John W. Brennan, M.D.*

Eosinophile Granuloma of the Vagina; an Anatomoclinical Contribution (Sul granuloma eosinofilo della vagina; contributo anatomo-clinico). Giuseppe Cantone. *Riv. ital. gin.*, 1953, 36: 464.

The author's patient was a 52 year old country woman, a mother of 4 sons, who had entered the menopause 5 years previously. The present affection began about a month previously with a sensation of acute pain in the vagina. These crises of pains had become progressively more severe and more continuous until for about a week there had been little relief from them. About a week previously the patient had noted a flow of blood from the genitalia. This stopped suddenly but recommenced 3 days later under the guise of a blood-tinged leucorrhea.

Physical examination disclosed a tumefaction in the right wall of the vagina; it was of the size of a small cherry and of soft elastic consistency with a tendency to bleed. Biopsy disclosed a histologic structure characteristic of eosinophile granuloma.

The lesion was extirpated and adequate roentgenologic therapy followed the excision of the tumor. The

patient's condition has since been checked at intervals of 4 months, 1 year, and 2 years. Cure seems to have been perfect; there is no evidence of recurrence.

The author considered this lesion of the vagina to be the first reported; however, after the article was ready for the printer he became acquainted with the article by McKay, Street, Benirschke, and Duncan (*Surg. Gyn. Obst.*, 1953, 96: 437), but he still decided to let it be printed as the American authors had obviously neglected the Italian medical literature in their studies. In this connection he considers particularly important the writings of R. Reitano (*Boll. Soc. med. chir.*, Catania, 1942, 10: 415).

The other Italian writers cited are the following: Lombardo and Piccinini (*Arch. Vecchi*, 1941, 3: 474), G. Fragalà (*Boll. Soc. med. chir.*, Catania, 1942, 10: 399), G. Lanza, and Truglio (*Arch. Vecchi*, 1948, 11: 849), L. Balli (*Ann. radiol. diagn.*, Bologna, 1949, 21: 263), and A. Pezzoli and E. Reggiani (*Arch. ital. mal. app. diger.*, 1952, 18: 1).—*John W. Brennan, M.D.*

MISCELLANEOUS

Hormonal Assessment by Vaginal Cytology. Erica Wachtel and J. A. Plester. *J. Obst. Gyn. Brit. Empire*, 1954, 61: 155.

The authors tried to evaluate the hormonal balance as indicated by exfoliated cells from the posterior fornix.

Hormonal assessment was carried out during the past 18 months on 15 adult patients; 2 of these patients showed an initial anovulatory cycle, and repeated assessments were made. Ovulation or failure to ovulate was confirmed by endometrial biopsy, and daily temperature charts were kept for comparison.

The method is based on two criteria: (1) a simple count of the cornified cells, expressed as a percentage of all squamous cells (cornification index, or C.I.) under the assumption that cornification is a function of estrogenization; (2) the presence of typical cyclical patterns, especially the occurrence of progesterone effects in the secretory phase 24 to 48 hours after the characteristic ovulatory picture. In fact, only the clustering of cells, the edge-curling of the individual cell, and the accompanying influx of leucocytes and microorganisms, together with a sharp drop in the cornification index are proof of ovulation. The ovulatory pattern is produced by a high estrogen level and can therefore be simulated by estrogen administration or abnormal estrogen production without ovulation, as occurs in the presence of a follicular cyst.

The cornification index in a normal ovulatory cycle shows a steady rise in the proliferative phase with a peak value at ovulation and a sharp fall as the corpus luteum starts functioning. There may be a secondary rise during the secretory phase but this never reaches the level of the peak value.

Prolonged amenorrhea does not necessarily indicate a low estrogen state in the body nor even an incapacity for ovulation and conception.

The authors used daily smears as a method of determination of hormonal balance as well as ovulation. It is sufficient to continue the curve in patients with problematical ovulation until definite secretory signs are present; failing these, the curve should be continued for at least 28 days or until a bleeding occurs.

The cornification index was regarded as the criterion of estrogenization and no account was taken of the staining reaction. The authors do not believe that the degree of acidophilia in smears stained by the Papanicolaou technique is a true index of estrogen balance since the staining reaction is dependent on the varying *p*H of the vagina.

The interpretation of these curves is quite simple. It is easy to say whether a patient has ovulated and it is possible, in retrospect, to say when ovulation has occurred. It is, however, essential to realize that smear patterns and cornification indices obtained on one day refer to the condition of the patient on the previous day, since it takes about that time for the cells to exfoliate and collect in the posterior fornix. Cornification curves are only a diagnostic help a posteriori, but have no prognostic value in the determination of ovulation time, and in fact do not even tell us whether ovulation is likely to occur.

Similar considerations apply to the estrogen curves obtained in newborn infants. The seemingly unexpected peak of estrogenization on the second full day of life is really a logical finding as it corresponds to the flooding of the infant's circulation with estrogens at the time of birth.—*Charles Baron, M.D.*

Postmenopausal Uterine Bleeding. John I. Brewer and William H. Miller. *Am. J. Obst. Gyn.*, 1954, 67: 988.

A study of 211 patients with postmenopausal uterine bleeding is presented. The authors stress the origin as uterine. Etiologically, the patients were divided into three categories: 27.5 per cent had malignant lesions, and 34.1 per cent had benign conditions, while in 38.4 per cent the cause of hemorrhage was undetermined.

In this series the incidence of endometrial malignancy was approximately half of the incidence in the literature. The authors thought that this was due to the increased use of curettage for minimal symptoms. Of the benign causes, polyps and endometrial hyperplasia were the most frequent. The group with undetermined cause of hemorrhage was extensive because such findings as atrophic endometrium, chronic cervicitis, and fibroids placed patients in this category.

Previous radiation for benign disease had no effect on the incidence of endometrial carcinoma. The quantity or frequency of bleeding was not a reliable factor in clinical diagnosis, although profuse bleeding was four times more common in malignant than in benign disease.

The authors discuss their management of the problem, which consisted of cervical smears for cytology, endometrial and endocervical curettage, and cervical biopsy. They caution against the false security of a history of recent estrogen administration. That a negative curettage is not infallible evidence of the lack of malignancy is demonstrated by the presentation of several cases of proved malignancy undetected at the first curettage.

Definitive therapy for cervical malignancy consists of radiation, and endometrial carcinoma is treated by hysterectomy either with or without radiation. The authors urge definitive therapy, either surgery or radiation, at the time of curettage whenever feasible.

In benign postmenopausal uterine bleeding they prefer vaginal hysterectomy.—*Henry C. Falk, M.D.*

The Action of Antibiotics on Bacterium Coli Infections Associated with Obstetrical and Gynecological Conditions; Terramycin and Combined Streptomycin and Terramycin. J. A. McCredie Smith and J. Smith. *J. Obst. Gyn. Brit. Empire*, 1954, 61: 145.

In vitro experiments have shown that terramycin has a markedly bacteriostatic but little bactericidal action on all strains of Bacterium coli tested. In similar experiments, the bacteriostatic and bactericidal effects of streptomycin were found to be almost identical. Certain strains of Bacterium coli, when passaged in broth cultures through increasing amounts of the antibiotics, developed slow resistance to terramycin but often marked resistance to streptomycin. When the same strains of Bacterium coli were passaged in broth cultures containing combined antibiotics, the development of resistance was inhibited. Clinical tests showed that terramycin was an effective chemotherapeutic agent in infections of the urinary tract. Further clinical tests showed that use of the combined antibiotic was even more effective, and that a shorter course of therapy could be given. The side effects arising from the use of the antibiotics were of negligible importance.
—*Charles Baron, M.D.*

Observations on the Pathogenesis and Morphology of the Precancerous Lesions of the External Genitalia of the Female (Osservazioni sulla patogenesi e sulla morfologia della lesioni precancerose dei genitali esterni femminili). Carlo Mossetti and Giorgio Fanzago. *Minerva gin.*, Tor., 1954, 6: 109.

The authors agree in essence with the assertion of Novak in his treatise (Saunders, 1952) that kraurosis of the vulva is a nosologic entity sui generis and has nothing to do with the atrophic form of leucoplakia. Kraurosis is not a final atrophic phase of leucoplakia, but is a primary affection, dependent upon blood supply and nutrition, developing at an earlier period of life than leucoplakia, and presenting a different histologic picture.

A leukoplakic lesion may, of course, develop in a kraurotic area; however, this is the result of infection, usually of chronic character, and this patch of hyperkeratosis with the other well known histologic characteristics of leukoplakia may later degenerate neoplastically. The kraurotic areas do not in themselves tend to such degeneration; the blood supply and generally poor nutritive conditions of the derma underlying the kraurotic area resists, rather than favors, malignant degeneration. The leukoplakic lesion in these instances of malignant degeneration always presents an abundant blood supply (hyperemia of inflammation) and the derma shows vigorous development and abundant infiltration with the lymphocytic invasion characteristic of chronic inflammatory processes.

Leukoplakia does not, of course, depend for its development upon the presence of kraurosis. It may, indeed, and usually does, develop independently. Its tendency to malignant degeneration is well known. Leukoplakia does, naturally, have an atrophic terminal phase which superficially may resemble the lesions of kraurosis; however, it always exhibits evidence in the derma of inflammatory activity and there is an absence of primary involvement of the blood supply. Its subcutaneous tissues are not, as a rule, so extensively degenerated (hyalinization), and they present evidence of hypertrophy.

In the 7 case histories here reported, together with the histopathologic studies of each case, the authors admit that the findings presented are pretty much "run-of-the-mill;" however, in this one particular, the participation of the derma in the pathogenesis of malignant degeneration of these vulvar lesions, they believe that they have made a contribution to the literature on this subject.—*John W. Brennan, M.D.*

Modern Anesthesia in Gynecology (Moderne Anaesthesie in der Gynaekologie). Willi Schultz and Hans Georg Voigt. *Geburtsh. & Frauenh.*, 1954, 14: 293.

The gynecological surgeon is encountering postoperative bowel disturbances more often than the abdominal surgeon because of the more frequent occurrence of small bowel adhesions in the vicinity of the pelvic operative area and the difficulty in achieving good relaxation. Apart from the well known points—to operate anatomically, not to constrict and squeeze tissue, to use Deschamp needles instead of sharp ligation, to peritonealize carefully—it is also very important in the prophylaxis of adhesions to avoid rough pushing with stick sponges, stuffing with lap towels, and using the Trendelenburg position because of inflow overfilling of the right heart. The vaginal approach is preferred, but if it cannot be used, it is necessary to avoid operative shock by proper anesthesia.

The authors previously used nitrous oxide and evipan as a basic narcotic, but believe now that the barbiturate "inactin" is much better. In the aged, in poor risks, and in larger procedures for carcinoma, including extirpation of the rectum and bladder after Brunschwig, the so-called "potentiated anesthesia" is used. An additional advantage of the drop in blood pressure to 100–80 mm. Hg systolic is the decrease in parenchymatous oozing. Pendiomid (quarternary ammonium compound) and other hypotensive drugs are scarcely ever used, while special hemostatic measures like adrenalin-novocain infiltration, gelfoam, and stryphnon gauze have long since become obsolete. It is important to have an experienced anesthetist establish contact with the patient before surgery, introduce intravenous anesthesia outside of the operating room, choose the anesthetic, give advice as to the speed and size of the procedure, and follow up the patient postoperatively. This is an important point in European clinics where trained anesthetists, at least in gynecological surgery, are still a rarity. The authors have used or observed relaxants in 3,300 cases, and potentiated anesthesia in 450 cases, and have seen scarcely any morbidity and no mortality attributable to the anesthesia. They report much less postoperative collapse and less nausea, vomiting, and respiratory irritation.

The question of an ideal short-acting anesthetic, e.g., for dilatation and curettage, is still unsolved. If barbiturates are not sufficient, ether must be used. No drug is yet available that can be used without respiratory depression and the necessity of artificial respiration. In obstetrical anesthesia, the ideal drug that does

not influence labor nor depress the infant is not yet available. Anesthesia during cesarean section has been improved; however, after "SEE" (a mixture of scopolamine, ephetonine, and eucodal) premedication, intravenous infusion is started and inactin is given a few seconds before the incision, with straight oxygen inhalation. Pantolax is given for muscle relaxation but its effect must be worn off by the time the cord is tied. The authors use the same method with section for eclampsia since inactin in the jaundiced patient does not damage the liver.

The well known anoxic and metabolic hazards of conventional anesthesia such as ether, evipan, peridural anesthesia, barbiturates, and nitrous oxide are avoided, or at least largely reduced with relaxant drugs. After "SEE" premedication the relatively nontoxic barbiturate (inactin) renders the patient, while still in her room, only unconscious. In surgery one or two injections of "pantolax" (succinylcholine) achieve better relaxation than the deepest ether anesthesia and make intubation unnecessary. Sometimes curarine is used. Larger procedures under this management may still produce shock. In such cases, therefore, Laborit's method of "potentiated anesthesia" with phenothiazine compounds is used. (The extreme of "hibernation" or artificial hypothermia with the use of ice is not indicated in any type of gynecological surgery). Since the level of the basal metabolism and anesthetic resistance are directly related, artificial lowering of the basal metabolism in metabolically healthy individuals will lead to an increased "potentiated" anesthetic effect and decreased oxygen requirements. Since these drugs act on the basic ganglia and the brain stem in blocking the vegetative nervous system, the unphysiologic operative stimuli fail to produce unwelcome counterregulations in the organism.

The following drugs are used in different "lytic" combinations intramuscularly or intravenously:

1. Megaphen is sympathicolytic; it lowers the blood pressure and temperature, is a strong central depressant and a good potentiation for hypnotics and narcotics.

2. Latibon is sympathicolytic and vagolytic; it has a strong central action.

3. Atosil is parasympathicolytic; it has a definite antihistaminelike action, but produces a weaker central effect.

The routine patient receives 50 mgm. of atosil orally the night before surgery, 50 mgm. of megaphen plus 50 mgm. of atosil intramuscularly 3 hours before surgery, 100 mgm. of dolantin 2 hours before, and atosil and megaphen intramuscularly 1 hour before surgery, according to the depth of anesthesia. The patients are still responding and have an excellent circulation. Paleness and apathy are signs of successful potentiation, and are not to be confused with peripheral collapse. Thirty minutes before surgery intravenous fluids are started to carry, if necessary, novocain-amid (pronestyl) (1 g/1,000 c.c.), or additional megaphen, atosil or dolantin, pantolax, inactin or evipan in small doses, as the patient might require. Fluids are used only to make up for the blood loss; straight oxygen is always recommendable. Central analeptics such as coramine and dexedrin are antagonists to the phenothiazines and are therefore contraindicated. The postoperative sleep should last 4 to 5 hours, with additional phenotiazine if necessary. Early awakening might lead to delayed shock. —*W. D. Bergman, M. D.*

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Accidental Hemorrhage: Abruptio Placentae. A. P. BARRY and F. GEOGHEGAN. *Irish J. M. Sc.*, 1954, 6: 189.

SINCE many other causes of maternal death have in recent years been brought under control, accidental hemorrhage in connection with abruptio placentae is now the foremost cause for maternal mortality. The mortality of accidental hemorrhage varies widely in different reports (between 1.1 and 10%), and the fetal loss ranges from 60 to 70 per cent in many clinics. The authors have reviewed the American and English literature extensively and have studied 1,015 cases admitted to the National Maternity Hospital between the years 1938 and 1952. They come to the conclusion that, assuming adequate transfusion facilities are present, fatalities in abruptio placentae or accidental hemorrhage are invariably due either to anuric renal failure in the first 2 postpartum weeks, or to intractable hemorrhage associated with fibrinogenopenia and shock, in fatalities occurring immediately after delivery. All cases may be classified as mild (slight vaginal bleeding, possibly associated toxemia), moderate (moderate external and some internal bleeding with peritoneal irritation, mild or no shock), and severe (shock; tender, distended, woody uterus; absent fetal heart tones).

It is well established today that in these cases thromboplastin from the damaged placental or decidual tissues at the separated placental site is liberated into the blood stream where it converts the plasma fibrinogen into fibrin. Thus, there will be a relatively short period during which the patient passes into the fully developed hemorrhagic state with blood that cannot clot. The stage will be set for the well known features of severe, usually fatal accidental hemorrhage in which, in spite of good uterine contraction, oxytocics, uterine plugs, and transfusions, the bleeding continues in the puerperium from every traumatized area in the genital tract.

The authors recommend observance of the following routine in order to prevent or treat this coagulation defect:

1. Estimate the coagulation time (Lee-White), the "binding power" of the clot, and the plasma fibrinogen (possibly by the quick Schneider "fibrin assay" test). It is thought that spontaneous bleeding occurs when the normal plasma fibrinogen level of 325 to 500 mgm. per cent falls below 200 mgm. per cent. Since the amount of fibrinogen in fresh citrated blood is small, massive transfusions may be required.

2. Transfusions can be effective only if given early, generously, and with the assumption concealed hemorrhage is greater than is often suspected. Pre-existing nutritional anemia can be a predisposing factor to hemorrhage.

3. Delivery should be hastened by artificial rupture of the membranes or with pitocin in an attempt to reduce the thromboplastin absorption. Neither of these methods was found to have an adverse effect on the underlying disease.

4. If these measures fail, pure fibrinogen in amounts up to 6,000 mgm. must be given intravenously.

5. Lower segment cesarean section must be performed unless delivery is imminent. To perform a section, however, in the presence of fibrinogenopenia (Couvelaire uterus) is to expose the patient to the risk of death in from 6 to 8 hours after operation.

6. If postpartum hemorrhage develops after the placenta is found to be complete, the uterus should not be explored nor the birth canal plugged, but fibrinogen should be given immediately.

To the second cause of death, anuria, the following factors contribute: chronic anemia rendered severe by a rapid loss of blood which may produce local anoxia; and in shock the renal blood flow and glomerular filtration are reduced to almost zero. This may be due to vasoconstriction in an attempt to conserve the circulating blood, which leads to severe persistent vasospasm.

Toxic cell damage and pre-existing renal disease in the frequently associated hypertensive states render the kidney more vulnerable. Franklin's uterorenal reflex, developing in cases of increased intrauterine tension, may be an additional important factor which also serves to emphasize the benefit of early rupture of the membranes. Sheehan and Moore's (1952) book on renal cortical necrosis is reviewed in its pertinent aspects.

In addition to the points stated above, the following procedures should be executed in oliguria or anuria:

7. Maintain an indwelling catheter and make an hourly record of the urinary output.

8. If the urinary output does not reach 30 c.c. per hour when shock is controlled, a pelvic block with 1 per cent procaine containing 1,000 Benger units of hyalase per 100 c.c. solution should be performed. The technique of the block is described in detail.

9. In cases of persistent anuria, Bull's dietary regimen should be instituted.

The authors reviewed 234 cases, of which 20 were too mild to require any treatment; 64 were classified as severe and 55 of these had an associated toxemia. There were 150 cases of pre-existing toxemia among the total number of 234. The condition appeared most often in the multiparas in the later years of childbearing, with an average parity of 4.8 and an average age of 32.6 years. Anuria occurred 10 times, and eclampsia in 1 fatal case. Rupture of the membranes was done 145 times, low cervical section 7 times, and blood transfusions 145 times.

Indications for section were: (1) nonresponding anuria, (2) hemorrhagic states with a long hard cervix, (3) severe external hemorrhage with failure of response to rupture of the membranes or pitocin, (4) fetal indications, which were accepted only when the two maternal complications stressed in this article had been brought under control.

There were 5 maternal deaths, 1 due to eclampsia and 2 to anuria. The total fetal loss was 112 (47.86%).

Fifteen well abstracted cases in the original article illustrate the necessary management.

—*W. D. Bergman, M.D.*

Placenta Previa: A Clinical Study of 350 Cases seen in Stockholm During the 10 Year Period from 1940 to 1949. A. WESTGREN. *Acta. obst. gyn. scand.*, 1954, 33: 29.

THIS investigation comprises 350 cases of placenta previa observed during the years 1940 to 1949. The incidence of placenta previa was 2.62 per thousand. Placenta previa recurred in 3 cases during the period under discussion. In 8 cases, the patient had a placenta previa before or after that period, and 1 patient had this complication on 3 occasions. The incidence in primipara was 26 per cent. Fifty-seven per cent of the multiparas had previously had a pathological pregnancy.

In 32 per cent of the cases the mothers received expectant treatment; cesarean section was done in 45 per cent and vaginal operation in 27 per cent; in 28 per cent the delivery was spontaneous.

The maternal mortality was 2.9 per cent (10 cases). The causes of death were as follows: loss of blood in 4 cases, a secondary infection in 1 case, and embolism in 1 case.

Of the 357 children born, 222 were still living 6 months after birth, the over-all infant mortality being 38 per cent. In 3 per cent of the cases death occurred before delivery, in 24 per cent during delivery, in 9 per cent before the fourth day of life, and in 2 per cent within the first 6 months of life.

The perinatal infant mortality was high in the cases in which the mother had anemia, was in a bad general condition, or had placenta previa of the central type. Fourteen, or 39 per cent, of the infants had a congenital malformation; 7 of them suffered from a malformation of the head.

In the group of mothers who received expectant treatment the incidence of cesarean section was higher than in the other cases. The maternal mortality was 7.3 per cent in the group. All these deaths occurred before 1945. The subsequent decrease in the maternal mortality was probably due to the extension of the facilities for blood transfusion.

The infant mortality in the group of mothers receiving expectant treatment was 45 per cent, as compared with 73 per cent in a group of mothers who were not treated expectantly.

The figures for the perinatal mortality showed only a slight improvement during the period studied and were much higher than those published from England and the United States in later years.

The authors recommend that patients manifesting symptoms of placenta previa be treated conservatively until the fetus has reached maturity, that more emphasis be placed on early diagnosis of placenta previa, and that the facilities for blood transfusion be extended.

Treatment should consist of spontaneous delivery, if necessary combined with artificial rupture of the membranes or the use of Willet's forceps. In cases in which these methods are not practicable a cesarean section should be the procedure of choice.

—*John R. Wolff, M.D.*

Fetal Losses in Hypertension and in Pre-Eclampsia. Prognosis for the Fetus According to the Week of Gestation. HOWARD C. TAYLOR, JR., ALVIN J. B. TILLMAN, and JOSEPH BLANCHARD. *Obst. Gyn.*, 1954, 3: 371.

THE analysis of data on 4,432 patients with various types of toxemia of pregnancy, who were treated at the Sloane Hospital in New York from 1931 to 1950, is presented.

The classification of the cases has been based upon the assumption that there are two types of "toxemia," one a pre-existent or chronic hypertensive condition, the other a specific hypertensive disease of pregnancy. There is at present no method or series of physiologic tests that will completely distinguish between the two conditions. In this series, the distinction has been made on the basis of the time of onset or detection of symptoms or signs.

The figures for total fetal mortality in toxemia of pregnancy, as reported in the literature, vary widely. Such general rates of fetal survival are nearly useless, however, from a practical point of view. Levels of blood pressure, the amount of albuminuria, and, for the pre-eclamptics, the week of onset affect the outlook so profoundly as to make these data essential in forming a judgment on the prognosis in an individual case and on determining the management.

The fetal results have been reported for the various types of toxemia of pregnancy, for three levels of blood pressure, three degrees of albuminuria, and for the time of onset.

On the basis of this formulation, the data indicate the following:

1. Patients with a blood pressure of over 180/110 and a 3 or 4 plus albuminuria should have their pregnancies terminated in the interest of the fetus in the thirty-third or thirty-fourth week.

2. Patients with severe hypertension (180/110) and moderate albuminuria (1 or 2 plus), those with moderate hypertension (160/100 to 179/110) and severe albuminuria (3 or 4 plus), as well as those with moderate hypertension and moderate albuminuria should have their pregnancies terminated in the thirty-seventh or thirty-eighth week, although here the theoretically arrived at statistical advantage is slight.

3. All other patients with less severe combinations of albuminuria and hypertension should continue with their pregnancy until labor starts spontaneously, or at least until the thirty-ninth or fortieth week, before labor is induced.

This formulation is based on the blood pressure level and albuminuria of the patient shortly after admission to the hospital. Other factors certainly affect the prognosis of the infant, such as the history of fetal loss in past pregnancies and evidence of exacerbation or improvement of the process under therapy after the patient's admission. The probability of loss from prematurity is also constantly changing, the present survival rates probably being somewhat better than the average for the 20 years during which the cases reported were observed. These rules should be modified by other clinical or laboratory data which are beyond the scope of this analysis.

—*Alan Rubin, M.D.*

So-Called Artificial Hibernation in the Treatment of Eclampsia (La cosiddetta ibernazione artificiale nel trattamento dell'eclampsia). A. CENTARO. *Riv. ostet. gin.*, Firenze, 1953, 8: 747.

SINCE 1952, 6 pregnant women in acute eclamptic attacks were subjected to artificial refrigeration. They all had severe attacks; in fact, the reason for subjecting them to this procedure was the doubt felt for success with the customary medical measures.

It would hardly seem appropriate to detail the entire technique at this point, especially since the authors themselves stated that the method is not yet entirely satisfactorily worked out. The general technique is merely a modification of that of Laborit and Huguenard for surgical patients with a playing down of the barbiturates in the pregnant women and an emphasis on the immediate application of heavy doses of the ganglioplegics for the purpose of as early control of the convulsive attacks as possible. For this purpose chief reliance seemed to have been placed on the sympathetic ganglioplegic largactil (thorazine). Also the bicarbonates were administered in rather large doses to combat the usual acidotic state of these eclamptic patients.

The one serious disadvantage proved to be the absence of stimulation by instrumentation, so that uterine contractions could neither be procured by the introduction of two tents, nor by dilatation of the cervix by means of Tarnier's dilator. This failure to provoke spontaneous delivery with the patient in hibernation was experienced in the first patient treated. After that, recourse was had, instead, to oxytocics with perfect satisfaction. Under 10 to 20 U dosages of the purified postepiphysial oxytocic "voegtlin," 3 of the children were born spontaneously, and satisfactory uterine contractions could be elicited in 5 of the 6 patients.

Five of the 6 children were born alive and vital; the death of the 1 fetus could not be attributed to the method of treatment. Not in a single instance did the convulsive attacks continue after the period of hibernation and, of course, birth of the child; the puerperium was normal in every way and the appearance of the lactational milk in the mother's breast occurred at the usual time. In 1 instance the state of hibernation was continued for 3 days without adverse effects. The blood pressure, which was always high on admittance, sank markedly during refrigeration and rose again after this period, but never as high as it was originally.

All in all, the author believes that the method of artificial refrigeration, or provoked hypothermia (Juvenelle), benefits the eclamptic patient, not only in that it relieves the cardiovascular system of the grave strain produced by the convulsive seizures, but also in the sense that it slows down the metabolism of the other organs as well, so that the decreased needs for the metabolism of these organs may prevent the noxa (whatever they are) of eclampsia from producing irreversible changes. —*John W. Brennan, M.D.*

Fetal Anoxia. JAMES WALKER. *J. Obst. Gyn. Brit. Empire*, 1954, 61: 162.

THE author conducted a comprehensive study into the causes and prevention of stillbirth and early neonatal death. Of special interest were those cases in which anoxia was responsible for the death of a fetus fully grown and otherwise normal.

The author stressed the importance of a falling oxygen supply as pregnancy becomes prolonged, as a causal factor in many of those deaths. Quantitative estimations of oxygen lend support to those who, on clinical grounds, have held that postmaturity is potentially dangerous. Unfortunately, of course, the oxygen supply to the fetus cannot be measured as a practical guide to treatment in individual cases, and so treatment must be based on careful clinical assessment.

A few clinical guides have been found helpful in planning the conduct of each case. The maternal weight is taken routinely at antenatal visits, and there are, of course, many variations of weight curves in individual pregnancies. However, a steadily rising curve with a halt and then a fall of some pounds at or after term is probably a significant sign in the type of case we are discussing. This valuable sign may be masked by fluid retention due to mild pre-eclampsia which is, of course, common at this time, gradual disappearance of the liquor amnii, and the picture of a firmer and more easily palpable fetus. Adequate liquor does not, however, preclude a dangerous degree of anoxia.

The author has formulated certain general principles of management which are a great help when used in conjunction with a careful clinical assessement of each case.

1. Induce labor before 40 weeks in cases of pre-eclampsia, or in those in which bleeding has occurred in the early months of pregnancy.

2. Primigravidas under 25 with otherwise normal pregnancies are allowed to go into labor spontaneously, but induction is performed if, after term, maternal weight is falling steadily, the liquor appears to be lessening, or pre-eclampsia develops.

3. If fetal distress develops during labor and especially if meconium is present in the liquor, oxygen is given to the mother and the case is assessed on clinical grounds. Especially in the older primigravida, and if a further period of prolonged labor is to be expected, cesarean section is seriously considered on the indication of "fetal distress." With the already anoxic fetus, cesarean section is often preferred if forceps delivery would be difficult and might put an undue strain on the fetus.

4. In primigravidas over 25 years of age labor is induced at the end of the forty-first week. If, at induction, the liquor is heavily stained with meconium, elective cesarean section is performed. Slowing of the fetal heart may not occur, or occurs too late to be relied upon as a sign of uncomplicated anoxic anoxia alone. It is unusual in primigravidas to find meconium staining at routine induction at this stage of pregnancy, and so, in practice, cesarean section will not often be necessary.

5. In multigravidas somewhat similar action is taken. Since most labors are short and easy, cesarean section is rarely called for, but induction at the end of the forty-first week is frequently performed. Where the previous child has been stillborn, delivery is usually achieved before term.

As pregnancy is prolonged beyond 40 weeks, the fetus suffers from an increasing shortage of oxygen, and un-

der certain conditions this can prove fatal. It is not at all clear why deterioration should occur. There is still a great deal to be learned about the physiology of normal pregnancy and the effects and mechanism of deviations from the normal. It would appear that, in most women, prolonged pregnancy is pathologic, but it is impossible to say why labor should fail to occur or when, in the given case, a delayed onset of labor becomes particularly dangerous to the fetus.

—*Charles Baron, M.D.*

Blood Loss from the Fetal Circulation: a Hazard of Lower Segment Cesarean Section in Cases of Placenta Previa. G. A. NELIGAN and J. K. RUSSELL. *J. Obst. Gyn. Brit. Empire*, 1954, 61: 206.

THIS study was prompted by a case in which an infant died at the age of 3½ hours from shock due to loss of blood from the fetal circulation, which had been damaged by the operator during delivery by lower segment cesarean section in a case of placenta previa. It had been noted previously on several occasions that babies suffering from blood loss due to this cause had to be given blood transfusions. From January 1951 to March 1953, cesarean section was performed forty-five times in cases of placenta previa, and lower segment operation was used as a routine. In 20 of these, placental tissue was found underlying the uterine incision to an extent which involved a risk of damage to the fetal circulation; that is to say, there was a 44 per cent chance of this complication being encountered.

The following technique is now employed in cases of placenta previa at this critical phase. A transverse incision no longer than 1 inch is made in the lower uterine segment. If the placenta is encountered the scalpel is immediately withdrawn and the incision extended on either side by means of fingers of blunt-pointed scissors. Although it may be difficult to get into the correct layer at this stage, with experience it has been found that it is possible to avoid gross disruption of the placenta. The placenta is then separated from its attachment by passing a hand upwards between the uterus and placenta until the sac of membranes is reached. The membranes are ruptured by the fingers and the child's face is delivered into the wound as quickly as possible. Once this has been done the umbilical cord is identified speedily and clamped. The remainder of the delivery takes place slowly and deliberately. The reason for delivering the child's face before clamping the cord is to reduce the chance of the child taking a breath in utero. In cases where the fetal vessels in the placenta have been damaged, delay in clamping the cord may result in serious blood loss from the fetal circulation, and by clamping the cord quickly the time available for blood to escape from the fetal circulation is reduced.

In every case of placenta previa the baby has been exposed to the risk of intrauterine anoxia, and while it may sometimes be possible to distinguish the picture of restless pallor with respiratory distress of the purely anoxic baby from that of the quiet, undistressed pallor seen in the exsanguinated baby, it was found impossible to assess the situation rapidly and reliably, on the clinical picture alone. It is assumed that if more than a half minute has elapsed between encountering the placenta and clamping the cord, or if there is visible damage to the vessels when the placenta is examined from its fetal aspect there is a risk of serious blood loss in that baby. In such a case it was found that serial estimation of the baby's skin-prick hemoglobin level is a useful guide to the urgency of the situation. Observations in 13 of the 20 babies whose placentas were encountered, and in 34 control babies, have led the authors to believe that if the level falls below 100 per cent (14.8 gm. per 100 ml.) within the first 24 hours of life, the baby has probably lost blood and requires to be watched with extra care; and if it falls below 90 per cent (13.3 gm. per 100 ml.) the baby requires a blood transfusion. If the fall occurs within the first 3 hours of life, the matter is one of urgency.

—*Harry Fields, M.D.*

LABOR AND ITS COMPLICATIONS

Cesarean Section in Elderly Primiparas. A Survey of 1,000 Cesarean Sections Performed on Elderly Primiparas at the Women's Clinics, University of Helsinki, from 1907 to 1950. LEO HIRVONEN and KALEVI NIEMINEVA. *Ann. chir. gyn. fenn.*, 1953, Supp. 5.

THE authors report the study of 1,000 cesarean sections in women over the age of 30. Approximately one-half of these were over the age of 35. One of the striking features of the study was the prolonged period of childlessness which these women experienced prior to their first pregnancy. The over-all maternal mortality was 2.1 per cent. There was a perinatal death rate of 4.8 per cent.

Although numerous obstetric indications were present for these cesarean sections, the authors concluded that uterine inertia, fetal asphyxia, breech presentation, a valuable baby, and rigidity of the soft parts were of especial importance in this particular group of women.

The age old question of whether or not older patients should be subjected to cesarean section as an elective procedure was raised. Actually, the authors frequently found other indications of an obstetric nature so that the answer was still not forthcoming.

—*James F. Donnelly, M.D.*

PUERPERIUM AND ITS COMPLICATIONS

On the Effect of Certain Obstetric Factors and Especially of the Routine Prophylactic Use of Oxytocic Drugs on Postpartum Hemorrhage in Vaginal Deliveries. K. SOIVA. *Ann. chir. gyn. fenn.*, 1954, Supp. 1.

As was expected, the routine use of oxytocic drugs greatly reduced the amount of blood loss during the third stage of labor. The authors noted the usual obstetric conditions which predispose to postpartum hemorrhage and have been reported in this country as well as elsewhere. Some stress was placed upon the fact that there was an increased inclination to postpartum hemorrhage when the patient was overly tall or overweight.

No complications were noted in association with the routine postpartum administration of oxytocic drugs.

By way of conclusion it was stated that routine administration of oxytocic drugs should be carried out in

abnormal labors and deliveries and in other cases in which postpartum hemorrhage is anticipated.

—James F. Donnelly, M.D.

NEWBORN

Should the Credé Prophylaxis of Newborn Ophthalmia be Modified? (Soll die Credésche Blennorrhoe-Prophylaxe abgeaendert werden?). E. WALCH. *Geburtsh. & Frauenh.* 1954, 14: 389.

EVER since the introduction in 1883 of Credé's prophylactic instillation of 1 per cent silver nitrate into the conjunctiva of the newborn attempts have been made to change this technique. In a very exacting study of the literature and of his own studies at the Women's University Clinic in Heidelberg, the author comes to the following considerations and conclusions:

A morbidity of about 0.1 per cent with silver nitrate is as satisfactory a result as any worldwide medical prophylaxis can achieve. Most of the failures can be traced to technical inadequacies and most of the severe injuries to faults or negligence in preparation and dilution.

In the ordinary routine use no damage is to be expected (see report of the National Society for the Prevention of Blindness in 1948 on more than 100,000 newborn). However, as an irritation of the conjunctiva results in 30 to 50 per cent of the cases, the method cannot be considered ideal. In an effort to find a better drug many substances have been tried and discarded if they did not fulfill the following ideal requirements:

a. Good effect against the pathogenic organism
b. No production of resistance
c. No local irritation
d. No deleterious side-effects

Penicillin in concentrations of 2,500 units per cubic centimeter was found to be very effective therapeutically and prophylactically since 1944, and has been recommended instead of silver nitrate. The author, however, objects to its general prophylactic use for the following reasons:

Since not only gonorrheal ophthalmia but also that produced by staphylococci, which are 50 to 60 per cent penicillin-resistant, and other organisms has to be covered by the prophylactic procedure, penicillin is useless in a number of cases. Widespread local use with its well known action would largely increase the penicillin-resistant pathogenic strains and later allergic manifestations. The question also arises whether the prophylaxis might not be outdated altogether when only a 0.004 percentage of eye infections occur in the newborn (1950). While this may be true in the United States with 80 per cent hospital deliveries and the availability of immediate antibiotic medication in the early postpartum period, European countries with only 40 per cent hospital deliveries must by all means continue the method. In the United States, after 8 years of intensive research, Credé prophylaxis is still required in all states, and one state also permits penicillin prophylaxis. *—W. D. Bergman, M.D.*

MISCELLANEOUS

Ureteral Injury in Pelvic Surgery. Current Thought on Incidence, Pathogenesis, Prophylaxis, and Treatment. KYRIL CONGER, CLAYTON T. BEECHAM, and TRUDEAU M. HORRAX. *Obst. Gyn.*, 1954, 3: 343.

IN a 5½ year study at Temple University Hospital, Philadelphia, comprising 2,290 major gynecologic cases, there were 13 ureteral injuries, an incidence of 0.56 per cent.

Ureteral injuries may result from the postoperative necrosis which takes place after stripping the ureter of its blood supply, or direct injury to the ureter itself may occur, usually during operations for carcinoma of the cervix. Ordinarily, both types of injury can be prevented by the preoperative insertion of ureteral catheters, which makes it easier to locate the ureter by the sense of touch, and makes dissection of the ureter unnecessary. The incidence of unrecognized ureteral injuries in a series of 200 patients was low (0.5 per cent).

Most ureteral injuries are correctible. Excellent results may be obtained by reimplantation of the ureter into the bladder by a simple method which is described. *—Alan Rubin, M.D.*

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Functional Effects on the Kidney During Muscular Exercise (L'atteggiamento funzionale del rene durante il lavoro muscolare). GUISEPPE CALI' and GUISEPPE LOMEO. *Policlinico, sez. prat.*, 1954, 61: 165.

SEVEN volunteer subjects were directed to walk rapidly up and down a long corridor for 1 hour following an hour of absolute bed rest. The ambient temperature was about 20 degrees C. (no sweating). Immediately before and immediately after this period of exercise, and then 1 hour later, specimens of blood and urine were taken and tested for endogenous creatinine, urea, and chlorides, and, finally, for the total urinary amounts.

It was found that the period of muscular labor reduced the renal excretion of urine, urea, and chlorides, but did not affect appreciably the excretion of creatinine.

This divergent behavior of creatinine in relation to the fluid constituent and the other molar clearances of the urine suggests that the secretion of urine on the whole is not a simple filtration process on the part of the nephron. In order, therefore, to retain the idea of filtration in the production of the urine, it was necessary to add some factor or factors in kidney functioning which would explain the fact that the urine as finally produced was not the urine which one would expect to get under the theory of the simple fluid and molar equivalences of a filtration process exclusively. This need gave rise to the filtration-reabsorption theory, that is, the theory that the urinary constituents, after being excreted by a simple glomerular filtration process, were selectively reabsorbed by the epithelial tubule of the nephron.

It is to this filtration-reabsorption theory that the authors object. Such a theory would suggest, or indeed postulate, for parts of this process an increased functional activity on the part of the kidney. However, the authors have shown, and it has been shown by others, that the blood supply during muscular exercise is less than normal for the kidney; thus it would seem an absurdity that an organ so dependent for its functioning upon the oxygenating capacity of the blood and upon the stimulating constituents therein contained (which normally whip the kidney up to greater secretory activity), should respond to a decreased blood supply by a process of overactivity.

Thus, the authors would like to propose a different theory, based on exacting experiments pertaining to muscular activity and its effect on the kidney function. This theory they designate as that of selective secretion by the nephron epithelium. They believe that the variations in the diuresis of water and of solids induced by exercise are caused by the diminished secretion by the nephron caused by a decreased renal blood flow; that is, the creatinine selective secreting function is less sensitive to a change in the renal blood flow than the secreting functions for water, urea, and the chlorides.

Fig. 1 (Mario Negro).

In order to determine whether creatinine might ordinarily prove insensitive to the experimental conditions here encountered and respond to more rigorous conditions, 3 of the 7 experimental subjects were induced to undergo an even heavier physical test. They undertook to run up and down stairs for an hour, instead of walking, as previously, along a corridor. At the end of the hour's stress it was found that there had developed a decided drop in the rate of renal clearance of the creatinine constituent of the urine. —*John W. Brennan, M.D.*

Pneumoretroperitoneum Combined with Stratigraphy as a Diagnostic Modus in Renal Malformations (Il pneumoretroperitoneo abbinato alla stratigrafia quale mezzo diagnostico nelle malformazioni renali). MARIO NEGRO. *Urologia*, Treviso, 1954, 21: 14.

AN 18 year old girl had suffered since early youth from urinary incontinence. The urinary seepage occurred, as a rule, when the patient was standing, and disappeared when she was in the recumbent position.

Cystoscopic examination disclosed a double ureteral orifice on the right side and a single orifice on the left. All three embouchures appeared to be normal. The author, of course, suspected the presence of either a vesicovaginal fistula, which could not be seen cystoscopically, or a supernumerary ureter communicating with the vagina. The hymen was intact.

The urographic examination disclosed, on the right side, a double kidney pelvis. On the left side the ureter could be seen only throughout its upper third, but it seemed to be normal. In this instance retrograde pyelography was of no help.

Still believing that there must be some communication between the urinary tract and the vagina, the examiner turned to pneumoretroperitoneum with the hope of uncovering some renal anomaly, particularly some anomaly of the left kidney. He introduced 1,200 c.c. of oxygen by the usual technique. On the right side the gas delimited an evident bilobed kidney. On the left side the gas did not delimit the medial contours of the organ; only the superior, lateral contour could be clearly seen. Nevertheless, during this procedure the left kidney shadow suggested a small extra image perched like a hood on the superior pole of the kidney itself.

On the more posteriorly located stratigram there was rendered even more evident the small hoodlike structure on the upper pole and, immediately above it, the suprarenal gland. On a more anterior stratigram the hoodlike structure disappeared. The lateral stratigram also confirmed the presence of the hoodlike structure in its upper portion; however, further down the gas did not penetrate along the posterior contour of the main kidney. This seemed to suggest intimate adhesions between the two structures in the nondelineated areas.

On the basis of these findings an operation was undertaken on the left side. The left kidney, at operation, appeared to be practically normal; however, perched on its superior pole was encountered a zone of parenchyma of roughly pyramidal form and of about the size of a walnut. The mass of parenchyma was rather intimately adherent to the tissues around it and, of course, to the main kidney in front. A rather bulky ureter led down behind the pelvis of the main kidney toward the pelvic cavity. This supernumerary ureter was ligated and cut, and the parenchymatous mass was removed together with the proximal stump by means of a cuneiform excision technique with the electric scalpel. Under the usual wound suture and postoperative care the patient convalesced without incident. The removed specimen is shown in FIG. 1.

The urinary incontinence ceased immediately.

—*John W. Brennan, M.D.*

Spontaneous Rupture of a Hydronephrosis into the Free Peritoneal Cavity (Rupture spontanée d'une hydronéphrose en peritoine libre). M. HELLER, E. SCHVINGT, and M. R. BOUCHARD. *J. urol méd.*, Par., 1953, 59: 902.

THE authors report the case of a 56 year old man with fever of 2 months' duration, minimal symptoms associated with micturition, and right lumbar pain radiating downward. The symptoms subsided on bed rest and treatment with antibiotics. On September 28, 1951 he again developed right-sided lumbar pain, characteristic of right renal colic and fever. On October 1, 1951 he was hospitalized because of the aforementioned symptoms. Clinical examination revealed dullness to percussion at the right lung base, a soft abdomen, and a palpable right lumbar enlargement.

Seven days later the patient suffered violent generalized pain over the entire abdomen; there was no movement of gas or fecal matter from the bowel; he was nauseated, and the pain at times became sharp and knifelike.

Eight hours after the onset of these severe symptoms, the abdomen became distended with muscle spasm, and tenderness was especially marked in the right iliac fossa. The leucocyte count rose to 24,500. The patient was transferred to the surgical service, with no change in symptoms after a period of 24 hours. Roentgenograms of the abdomen showed several low fluid levels. Because of the tentative diagnosis of a perforated appendix with symptoms suggestive of peritonitis, it was decided that an exploratory laparotomy should be done.

A right pararectal incision was made. On opening the peritoneum, between 1 and 1½ liters of cloudy, brownish, odorless fluid was removed. A normal appendix was removed, and exploration of the abdomen showed no definite intra-abdominal disease. Because of the large amount of free fluid in the abdominal cavity, a drain was used in closing the incision. During the next 5 weeks, drainage through the abdominal incision continued. The fluid resembled urine, usually about 900 c.c. The urea concentration of this fluid was about half that from the left kidney.

Examination of the bladder showed it to be markedly injected. The left ureteral orifice was normal; it was not possible to catheterize the right orifice. A left retrograde pyelogram was normal. An intravenous pyelogram did not show right-sided renal function. Because of a functionless right kidney, exploration of the region of the right kidney and of the right renal fossa was done. The kidney was found to be adherent to the surrounding structures, and especially to the peritoneum. Following a right nephrectomy, the patient had an uncomplicated convalescence.

Spontaneous rupture of an uninfected hydronephrosis into the free peritoneal cavity is possible.

In the case reported, the symptoms were those of an acute intra-abdominal perforation with signs of reflex ileus, and localization of the pathology in the right iliac fossa, due to rupture of the right hydronephrosis and channeling of the urine along the right mesenteric gutter.

Urinary drainage across the peritoneum was maintained for 5 weeks without any untoward peritoneal reaction or interference with the normal intestinal peristalsis.

Rupture of a noninfected hydronephrosis into the free intraperitoneal cavity occurs only rarely, for a similar case has not been found in the literature.

—*Conrad A. Kuehn, M.D.*

Hilus Cysts of the Kidney as Shown by the Roentgenogram (Hiluscysten der Niere im Roentgenbild). RICHARD UEBELHOER. *Urologia*, Treviso, 1954, 21: 21.

FOUR instances of this peculiar cystic formation of the renal hilus are reported. In all, the symptoms were meager in the variety of their manifestations. There were only vague pains in the corresponding lumbar region, or perhaps an attack or two of hematuria of mild character. In all these instances the condition was treated surgically. The roof of the cyst was removed and the serous contents were drained away; at times such portions of the remaining cyst wall which could be easily reached were scraped away. Wound closure was carried out in each instance in the usual manner. Convalescence was always un-

eventful and no patient has exhibited any further symptoms.

Such results are, of course, well known. The roentgenographic manifestations are also well known, such as the tipping at right angles of the upper calyces and the lengthening of the pedicle of these calyces without (as distinguished from the cystic kidney) a reduction in width or slenderizing of the lengthened pedicle. The upper calyx is shown in the original article, coming down and connecting with the main pelvis by means of a long, wide band of shadow.

As familiar as the manifestations are, there is one aspect of the roentgenologic picture which the author believes to be unique and worthy of report specifically at this time. This aspect corresponds to the author's observation with reference to the discrepancies encountered between the urographic and the retrograde pyelographic images. These hilar cysts, small and irregular in appearance, protruding from the kidney hilus, and burrowing (so to speak) among the hilar structures so that the hilar blood vessels present the appearance of being stretched fanwise over the cyst, nevertheless exert so slight a pressure that the retrograde filling of the kidney pelvis with shadow-casting material is frequently sufficient to iron out any deformities and show the shadow of the renal pelvis in almost normal form. With the urographic technique, on the other hand, there is observable a shadow defect upon both urographic and ascending pyelographic examination with the largest shadow corresponding to the area of greatest development and protrusion of the cyst itself. —*John W. Brennan, M.D.*

A Pelvic Flap Operation for Certain Types of Ureteropelvic Obstruction: Observations After 2 Years' Experience. ORMOND S. CULP and JAMES H. DEWEERD. *J. Urol.*, Balt., 1954, 71: 523.

AN ADDITIONAL method for certain types of ureteropelvic operations on the kidney is described by Culp and DeWeerd. These authors operated upon 27 patients and followed them up for 6 to 24 months. Seventeen of the patients now present an essentially normal kidney, 8 others have shown marked improvement, while 2 present complete failure of the operation. —*Paul R. Leberman, M.D.*

Pedunculated Hemangioma of the Ureter. M. LEOPOLD BRODNY and HYMAN HERSHMAN. *J. Urol.*, Balt., 1954, 71: 539.

ONLY 32 acceptable cases of truly benign primary tumor of the ureter could be collected in 1948. Two were hemangiomas and a third case was said to be an unclassified vascular growth.

This report is of a white female, aged 49 years, who complained of pain on urination and one episode of hematuria. A mass protruded from the left ureteral orifice which was biopsied cystoscopically and proved to be a polypoid hemangioma. The renal pelvis and upper ureter were normal. The juxtavesical portion of the ureter was dilated and contained a filling defect.

A left ureterostomy was performed through a Gibson incision and a tumor 6.5 cm. by 0.3 cm. was removed. It was attached by a narrow pedicle to the lateral wall of the ureter. The base was excised and the patient made an uneventful recovery. Further histologic study of the specimen showed only the typical picture of hemangioma.

Similar treatment is urged for other benign ureteral tumors. —*Ormond S. Culp, M.D.*

Calculi Abandoned in the Residual Stump of the Ureter (Sopra i calcoli abbandonati nel moncone ureterale residuo). MARIO MANCINI. *Policlinico, sez. chir.*, 1954, 61: 1.

THREE cases of abandoned ureteral stump calculi are reported. The occasion represents the author's thesis for specialization in urology at the University of Bologna.

The first patient was a 40 year old male who, after a long period of intermittent attacks of urinary infection and colic, was nephrectomized for hydronephrosis calculosa in 1952. After a few months the symptoms of urinary colic and infection returned and the roentgenologic examination revealed a juxtavesical stone. A total ureterectomy was done 8 months later by Forni. Through a parailiac incision a dilated ureteral sac, the size of a small intestine and containing a hazelnut-sized stone was excised. The operation was completely successful.

The second patient was a 38 year old woman, who was nephrectomized in 1939 for tuberculous pyonephrosis. Following the operation a lumbar fistula developed at intervals and for the past 3 years the patient had been suffering pains of colicky nature and some urinary disturbances. In 1947 the patient came to the author's service and roentgenologic examination disclosed a small stone in the stump of the ureter left from the nephrectomy. Since the disturbances experienced were not serious, nothing was done.

The third patient was a 43 year old woman who was nephrectomized for pyonephrosis calculosa and subsequently was perfectly well for a brief period after the operation; then the pains recommenced and roentgenologic examination uncovered a juxtavesicular stone in the residual stump. In this case a fulguration of the ureteral meatus was carried out and an unsuccessful attempt was made to extract the stone. The disturbance was ameliorated and the patient left the clinic without further treatment.

The author insists that stones do not form in the residual stump or, at most, the possibility of such formation, or recurrence, is purely theoretical. In trying to explain how the stone could have been left behind, he comes to the conclusion that either the stone was of such a type as not to be roentgen-opaque (cystine, xanthine, uric acid), so placed as not to obstruct the ureteral catheterization, or, finally, that the surgeon, aware of the presence of the stone, did not consider the removal of the calculus feasible at the time.

At any rate, the removal of the stone together with the containing ureteral stump is apparently easily done and is not dangerous. The presence of the calculus represents—as the medical literature amply proves—a menace to the future health, and even life, of the patient. Through a parailiac incision the ureteral stump can be approached without too much difficulty, ligated flush with its attachment to the bladder wall, and extirpated.

—*John W. Brennan, M.D.*

Anomalies and Complications of the Urogenital Tract Associated with Congenital Imperforate Anus. HARRY M. SPENCE. *J. Urol.*, Balt., 1954, 71: 453.

APPROXIMATELY one-third of the 44 cases of imperforate anus seen at the author's hospital have exhibited some major urological disorder. The characteristic genitourinary anomaly associated with this condition consists of some form of abnormal communication between the lower intestine and the genitourinary passages, such as rectovesical fistula, rectourethral fistula, or some variety of persistent cloaca. These conditions may be found not only as a result of faulty embryological development of the primitive hindgut with failure of the urorectal septum completely to partition the two channels, but may follow operative accident in surgical correction of the original condition.

The aim of treatment is complete separation of the urinary and intestinal tracts and the establishment of control at both outlets. Each case must be individualized with complete preoperative examinations, such as cystourethroscopy, endoscopy of the bowel, urography, and roentgenographic bowel studies. Until recently, the preferred method of correction of the imperforate anus itself has been by the perineal route, usually requiring extensive perineoplasty to bring the blind-ending rectal pouch down to the perineum. In the opinion of the author the one stage combined abdominoperineal "pull-through" type of operation developed by Norris in 1949 is more suitable for these conditions, particularly for rectourethral fistula.

Through the opened abdomen the bowel is dissected from the pelvic floor downward until the blind rectal end is isolated. A clamp is then inserted through a short perineal incision in the estimated center of the sphincteric area and the rectum is drawn out through this and sutured to the skin of the perineum.

It should be borne in mind also that a complicating urological component of any given case of imperforate anus may arise by coincidence, with no direct relationship other than the tendency of congenital anomalies to be multiple. Three of the author's 15 cases fell into this etiological classification. Treatment consists of correction of the primary urological disorder by standard technique.

A detailed survey of a personal series of 15 cases is presented with accompanying illustrations and photographic reproductions. —*Allan K. Swersie, M.D.*

BLADDER, URETHRA, AND PENIS

A Physiological Study of Vesical Lymphatics. ROGER BAKER, DUNCAN E. GOVAN, and JOHN SAWYER. *J. Urol.*, Balt., 1954, 71: 435.

IN RECENT years there have been several clinical investigations of vesical carcinoma for the purpose of establishing accurate prognostic criteria by correlating the clinical with the pathological findings. Specific therapeutic procedures may then be established on a reasonable basis, depending on the degree of invasion.

One of the significant conclusions is that cancer of the bladder that has deeply invaded the muscle layers is usually fatal if treated by segmental resection or simple cystectomy without lymphadenectomy. There has, however, been no conclusive data presented on the lymphatic dissemination of early noninvasive carcinoma of the bladder which has invaded the submucosa but not the muscle. Can an early vesical neoplasm of this type spread to the regional or abdominal lymph nodes? Can it spread to the contralateral side of the bladder through the lymphatics? If these questions are answered in the affirmative, then it appears that simple cystectomy does not offer the maximum possible cure rate, and if segmental resection is performed, a considerably larger portion of the bladder should be excised than is now commonly practiced.

The anatomy of the vesical lymphatic system has been well demonstrated in the postmortem bladder specimen, but the functional nature of the system under physiological conditions has not been portrayed. The authors have studied the vesical lymphatics experimentally by physiological approach.

Operative procedures were performed on 10 healthy male and female mongrel dogs, by injecting 0.1 c.c. of a prepared India ink suspension submucosally into one of ten chosen bladder areas, the area differing in each dog. These areas were divided as follows: four anterior, four posterior, and two lateral. The injections were made through a small opening in the midline of the bladder at a point distant to the injected area.

The suspension was injected gently to avoid traumatic dissemination of the particles and appeared as a submucosal bleb only 1 to 2 mm. in diameter. Twenty-four hours later the dogs were sacrificed. A complete exposure of the pelvic and abdominal lymph node chains was made. All nodes were sectioned and those grossly involved with India ink particles were noted and their site recorded. The excised bladder specimen was fixed in formalin solution for 1 week and then sectioned in a coronal plane through the site of injection.

The dissemination of India ink particles from each of the ten areas is described in detail with photographic illustrations. Several general observations were noted which were applicable to all areas. The particles disseminated predominately within macrophage cells observed in the lymphatic channels accompanying blood vessels in the muscle layers and less frequently in the submucosal and adventitial layers. Most distant spread within the bladder was constantly noted in the muscle layers. Twenty-five to fifty per cent of the bladder circumference in the sections studied was invaded. The lymph nodes were involved in 6 of the 10 dogs.

Since India ink injected into the bladder of the dog is not cancerogenic, it would be scientifically injudicious to infer too great clinical significance from the results illustrated by this experiment for the human bladder. The India ink particles disseminated primarily within the lymphatics through the submucosal and muscular layers to the adventitia, and, secondarily, in a radial manner within the muscle. Such an anatomical arrangement in human bladders was demonstrated by Powell.

The diffusion involving large areas of bladder circumference crossed the midline anteriorly or posteriorly except when the site of injection was on the lateral bladder wall. Three of the four anterior areas and

both lateral areas drained particles to the regional lymph nodes.

If the analogy is comparable, there should be a re-evaluation of the clinical impression that all bladder cancers involving the mucosa, submucosa, and superficial muscle layers are potentially curable by surgery confined only to the bladder. Any surgical procedure that fails to include lymphadenectomy would fail to eradicate the disease in a large percentage of cases.

—*Allan K. Swersie, M.D.*

Traumatic Obstructions of the Neck of the Bladder (Les obstructions traumatiques du col vésical). L. Sabadini. *J. chir.*, Par., 1954, 70: 289.

This urologic surgeon, serving at the Mustapha Hospital in Algiers, is still an advocate of early retrograde roentgenography of the urinary passages in instances of trauma to the bladder, although his views with reference to this form of examination in instances of trauma to the kidney were rather generally criticized by the French savants in 1951 (*Surg. Gyn. Obst., Internat. Abstr. Surg.*, 1951, 94: 166).

In the present report, the author discusses the treatment of vesical neck obstructions developing as the result of neglected ruptures of the prostatic urethra in young boys. He presents the advantages of an immediate retrograde urethrogram in diagnosing the type of lesion present, thereby permitting early surgical interference, with reconstruction of the urethra over a special rubber tube (tuteur) which he himself has devised. This tube is passed through the urethra and bladder to emerge through the suprapubic cystostomy opening. The cystostomy opening, of course, is also utilized as a means of passing a catheter into the bladder itself, for drainage purposes.

With this method of early examination the author maintains that there can be distinguished three types of urethral rupture. Limitation of the contrast material to the region of the perineum is observed in (1) rupture of the membranous urethra in the adult; perineal and preurethral deposits are demonstrated in (2) intermediate ruptures (not involving the entire extent of the prostatic urethra); and extensive intrapelvic diffusion of the shadow preparation upwards and laterally is seen in (3) complete ruptures of the prostatic urethra in the young boy. This last mentioned type of rupture is of significance in that it is likely to be mistaken for a rupture of the bladder wall. Here, with the method of retrograde urethrography, the distinction should be easily made; in ruptures of the bladder the shadow-casting deposits are located suprapubically rather than retropubically.

In the presence of ruptures of the prostatic urethra in children, the surgeon is apt to think he is dealing with a bladder rupture. He approaches the bladder suprapubically, and, finding a dehiscence in the general region of the anterior wall, closes it with sutures, under the impression that he is closing a laceration of the vesical wall itself, while actually he is closing the neck of the bladder. The residual suprapubic fistula then gives satisfying relief of all symptoms and healing is allowed to proceed of itself. Under these circumstances there eventually develops a huge intrapelvic callus involving the prostatic urethra and extending to the neck of the bladder.

It is for these youthful patients with practically complete disruption of the prostatic urethra—which is so short—and the prostatic gland—which is so poorly developed—that the author has introduced the special operative procedures described. The huge mass of intrapelvic fibrous tissue which blocks the neck of the bladder and is attached to the posterior aspect of the pubis requires two routes of approach: the perineal and the suprapubic. In the perineal approach, the perineum is incised down to the mass of callus and this mass is then excised as far as the bladder neck. At this point in the operation it may be advantageous to depress the flow of the bladder by means of a closed clamp introduced into the bladder through the suprapubic cystostomy opening. An incision is then made suprapubically, with temporary closure of the cystostomy opening, and the dissection is carried down behind the pubis to connect up with the cavity left by the perineal dissection.

With the field thus prepared, the vesical neck is incised for a short distance upwards so as to gain access to the vesical cavity in the region of the neck; then, since this vesical neck is sclerotic, it is entirely cut away together with all the remaining sclerotic tissues. The tube is then passed through the penile urethra, traverses the huge cavity left by the dissections and the cavity of the bladder itself, and finally emerges through the re-opened cystostomy. The non-sclerotic resilient tissues are now closed down about the tube and the wound repair is completed in the usual manner.

During this radical procedure, the surgeon must be on guard against injuring the ureters. If the ureteral openings cannot be readily located—which happens all too frequently—the author suggests the possibility of an intravenous urography to assist in their location.

A long period of after-care is necessary; however, when all requisites have been fulfilled, the operation eventually results in a serviceable functioning of the urethra. Figure 19 in the original text shows the retrograde urethrographic picture 10 months after the operation.

The author's report is based on an experience of 5 patients, and on the basis of such experience he highly commends the procedure. The one important objection to the technique is that it precludes any future possibility of the procreative function.

—*John W. Brennan, M.D.*

The Diagnostic Difficulties in Instances of Bilateral, Extensive Diverticulosis of the Bladder (Rilevanti difficolta diagnostiche in enorme diverticolosi vescicale bilaterale). Ferdinando Stefani. *Urologia*, Treviso, 1954, 21: 48.

The author's patient was a 72 year old lawyer who complained of severe micturition pains, stranguria, pollakiuria, and pus in the urine. After the cystitis was somewhat ameliorated following vesical lavages and the administration of streptomycin, cystoscopy was done. This examination revealed an opening, at least the size of a 22 Charrière, lying slightly above and to the left of the left ureteral orifice. At this time the region about the right ureteral orifice was involved in severe inflammatory reaction, but otherwise appeared to be normal.

The instillation of contrast material through the described opening in the bladder wall disclosed the presence of a diverticulum which was larger than the bladder itself. Through the usual suprapubic incision the diverticulum was extirpated, extravesically and extraperitoneally, without special difficulty.

After the operation, as the result of streptomycin protection, the wound healed without incident, the urine became almost clear, and the symptoms of bladder inflammation disappeared. The permanent catheter was removed on the ninth postoperative day and the administration of streptomycin was discontinued at about this time. A few days later the preoperative symptoms began to recur and were accompanied by a few elevations of temperature. The urine became more and more purulent. The urinary findings cleared up the situation, since it was present in the guise of the Gallizia sign, that is, there was notably more pus as well as fibrin in the second half of the divided micturition phase. These manifestations indicated the presence of another diverticulum.

The cystoscopic examination was repeated and this time disclosed the second diverticular aperture, immediately above and to the right of the right ureteral aperture. The newly discovered opening was about the size of a 16 Charrière. Pressure over the hypogastrium caused a small stream of pus to exude from the abnormal aperture.

The presence of, and the size and conformation of, the diverticulum could be demonstrated by means of intradiverticular instillation of a roentgenopaque material through the opening and a small catheter (No. 5, introduced through the cystoscope) which was curled up within the extravesical cavity. This loop of catheter showed that the diverticulum was small and that it was close to the posterior surface of the bladder itself, thus explaining how the lesion could have been missed on the previous examinations. The absence of bleeding during these manipulations would suggest an epithelial lining for the cavitation (true diverticulum).

The removal of this second diverticulum was more difficult than that of the first because of the tenacious adhesions, particularly those between the diverticulum and the bladder wall. Isolation of the diverticulum was greatly aided by the loop of the re-introduced catheter. The diverticulum when cut away left a dehiscence of the bladder wall large enough to permit removal (through it) of the prostate. The prostate was not notably increased in size or consistency; however, the patient was so preoccupied with his previous sufferings, which he ascribed to his prostate, that it was thought best to remove it.

There remained the matter of closure of the opening in the bladder wall. This was a rather delicate procedure as a result of the proximity of the ureter. The problem was solved by passing the first two stitches in such a manner as to include the juxtavesical portion (1 cm.) within the new wall, so that the ureter was not only included in its intramural portion, but also by about 1 cm. of its trajectory immediately above. This expedient did not produce any angulation or stenosis of the ureteral lumen.

Histologic examination of the two removed diverticula revealed the absence of muscle fibers (acquired diverticuli).

The patient has been completely and permanently cured by the operations.

—*John W. Brennan, M.D.*

Exstrophy of the Urinary Bladder; Further Study of Treatment by Plastic Surgery. T. H. Sweetser. *Arch. Surg.*, 1954, 68: 525.

The author discusses the difficulty of repair in exstrophy of the urinary bladder, telling of failures and reporting 2 cases. In 1 case several heaped up folds of mucosa were resected and in the other case parallel longitudinal incisions were made into the outer layers of the bladder after it had been mobilized and invaginated. In the first case the suture line broke down and a ureterosigmoid transplant of ureters was necessary. In the second case the bladder was repeatedly stretched over the bag of a Foley catheter so that after several months the capacity reached from 20 to 30 c.c.

A review of the literature is given.

—*Paul R. Leberman, M.D.*

A Restudy of the First 1,400 Tumors in the Bladder Tumor Registry, Armed Forces Institute of Pathology. A. L. Dean, F. K. Mostofi, R. V. Thomson, and M. L. Clark. *J. Urol.*, Balt., 1954, 71: 571.

Reports had been issued in 1934 and 1936 regarding other aspects of this series of bladder tumors. The 1,400 cases in the current review represent only 22 per cent of the tumors in the Bladder Tumor Registry at the end of 1950. They were reviewed this time to determine the results of treatment. Civilian physicians had contributed 96 per cent of the cases. Twenty-seven per cent were followed up for 5 or more years and 13 per cent were followed up for 10 to 26 years.

Males predominated by a ratio of 3 to 1. Two-thirds of the patients were from 50 to 69 years of age. Single tumors were found in 73 per cent of the patients and 25 per cent had multiple growths. The trigone was the most common site of the tumors. The tumors which occurred in the vault of the bladder tended to be more infiltrating, presumably because they were discovered later.

Papillary tumors were most common, but infiltrating and noninfiltrating types were of about equal frequency. Ninety-six per cent of the papillary tumors were composed of transitional cells, and 50 per cent of the sessile nodular growths were of transitional epithelial origin.

All of the patients had been treated prior to 1937. Resection, radon, and x-rays were employed most frequently for high grade lesions, while electrocoagulation or excision was used in two-thirds of the cases with grade I tumors. Radon did not appear to alter the results.

Adequate follow-up data were available in 1,004 cases. In this group 725 patients had died, 113 were living with tumor and/or metastases, and 166 were free from tumor. Seventeen per cent of those with follow-up studies were free from tumor after 5 years, 10 per cent had no tumor after 10 years, and only 5 per cent were free from tumor 15 or more years after treatment.

As might be expected, the more malignant growths had the poorest prognosis. Ninety-one per cent of the infiltrating tumors had metastases within 5 years,

while 52 per cent of the noninfiltrating neoplasms had metastases within the same period.

Many detailed analyses of the series are presented in a total of 18 tables. For the most part they merely offer statistical proof of popular concepts regarding the gravity and behavior of vesical neoplasms.

—*Ormond S. Culp, M.D.*

The Ileocecal Segment as a Substitute Bladder; A Review of 18 Cases. JAMES W. MERRICKS and R. K. GILCHRIST. *J. Urol.*, Balt., 1954, 71: 591.

IN 1950 THE authors reported a technique for constructing a substitute "bladder and urethra" from the cecum and terminal ileum. The method was employed in 27 cases, 18 of which are reviewed in this report (9 others are mentioned in an addendum).

Two of the 18 patients had benign lesions (exstrophy and eosinophilic granuloma of the bladder, respectively). They are living 13 and 24 months after the operation. Six of 16 patients with cancer were incurable. One died soon after the operation. All were dead within 2 years.

There were 10 patients with carcinoma that seemed to be amenable to "cure." Five patients had malignant vesical tumors. Five had carcinoma of the cervix. Lymph nodes were removed with the bladder when the neoplasm was primary in the bladder. Exenteration was employed for carcinoma of the cervix. Three patients in this favorable group died during the early postoperative period (1 each with peritonitis and pulmonary metastasis, anuria, and hepatitis). Two other patients were dead within 18 months because of intestinal obstruction and cardiac disease, respectively.

The 5 patients with cancer who survived have been followed up for 10 to 26 months after operation. One patient with carcinoma of the cervix appears to be well even though his lymph nodes contained metastatic tumor. Another patient with carcinoma of the cervix developed a perineal urinary fistula that healed after continuous suction. A third patient with a primary cervical neoplasm has ureteral reflux and mild hyperchloremic acidosis.

One survivor who had carcinoma of the bladder now has a recurrence in the vaginal stump. Another patient with infiltrating vesical carcinoma developed obstruction at the site of the ureteral implantation but this was corrected satisfactorily by open meatotomy.

Most of the substitute bladders hold from 320 to 500 c.c. Continence may not be complete for 2 to 3 months. A clean but unsterile 18F catheter is inserted through the "ileal urethra" at intervals of 3 or 4 hours.

Although urine in the cecal bladder remains infected, only 4 patients have had any pyelonephritis.

Chemical imbalance (including acidosis) was confined to 1 patient who died after much gastrointestinal difficulty and another in whom this difficulty was controlled easily with soda.

Two patients required postoperative shortening of the ileum to eliminate kinking, 2 had to have revisions of the stoma on the skin because of stricture, 1 developed kinking of the ureter just above the cecum, 1 was found to have a mild intramural ureteral stricture, and 2 developed calculi in the new bladder.

No patient has found it necessary to wear a bag. Some have to contend with considerable mucus but others do not. Some patients insist that the substitute bladder requires less care than their colostomy. All survivors seem to be satisfied with this type of urinary diversion. The authors are using it more frequently in the treatment of infiltrating vesical carcinoma.

—*Ormond S. Culp, M.D.*

Observations on the Use of the Cecum as a Substitute Urinary Bladder. JAMES G. M. HARPER, MICHAEL H. BERMAN, ARTHUR D. HERTZBERG, FRED LERMAN, and HERBERT BRENDLER. *J. Urol.*, Balt., 1954, 71: 600.

SIX patients with carcinoma of the bladder and 1 patient with multiple urinary fistulas had bladders constructed by the method of Gilchrist and Merrick.

One patient died of pulmonary embolism 9 days after the operation, and another died of peritonitis on the twentieth postoperative day.

The 5 other patients are living 1 to 6 months after operation. So far none has had pyelonephritis, azotemia, or acidosis. Excretory urograms have shown only slight dilatation of the pelvis and ureter. In 1 case the ileal loop had to be shortened later. A postoperative fecal fistula healed spontaneously.

Some patients have preferred to wear an indwelling Foley catheter and unclamp it periodically rather than empty their substitute bladder by intermittent catheterization.

There has been no ureteral reflux in the 3 patients of whom postoperative cecograms were taken. A modified Coffey I type of ureteral transplantation was used in all cases. None of the 5 patients has worn a bag or has been troubled with leakage.

—*Ormond S. Culp, M.D.*

Simultaneous Chordee Repair and Urethral Reconstruction for Hypospadias. Experimental and Clinical Studies. ROBERT M. MCCORMACK. *Plastic & Recon. Surg.*, 1954, 13: 257.

THE author presents a method of repair for chordee and a reconstruction for hypospadias by means of utilization of a full split thickness graft immediately following the repair of chordee. The second stage is performed under conditions which permit primary healing in the presence of the urinary stream.

The author emphasizes the principles of atraumatic handling of the tissues, adequate layer closure, and the use of proper suture material. He presents the clinical results in 3 completed cases.

—*Paul R. Leberman, M.D.*

GENITAL ORGANS

Persistent Anterior Lobe of the Prostate Gland. OSWALD S. LOWSLEY and ALEJANDRO PÉREZ VENERO. *J. Urol.*, Balt., 1954, 71: 469.

EMBRYOLOGICALLY the prostate gland originates from five foci which later form the five lobes of the gland, namely, the anterior, posterior, middle, and right and left lateral lobes. The anterior lobe is formed from tubules from the ventral wall of the posterior urethra together with their surrounding stroma. At first, relatively large and multi-branched, they gradually contract so that at birth they show no lumina and appear as small, solid epithelial outgrowths of academic interest only.

On rare occasions, however, the anterior tubules persist into adult life. The senior author, in studies of thousands of embryological, anatomical, and surgical specimens, over a period of 44 years, has observed only 18 cases of persistence of the anterior lobe. Most persistent anterior lobes consist of small (pea sized) intrusions from the ventral aspect of the vesical sphincter which cause no symptoms; however, the lobe may become subject to disease—almost always an adenomatous hypertrophy, usually a solitary enlargement and not part of a general process—and may cause urinary obstruction.

Two cases of persistent anterior lobe hypertrophy requiring operation are described. In both cases the diagnosis was evident on cystoscopic study preoperatively. One obstructing mass was treated by suprapubic enucleation and the other by transurethral resection. Relief of symptoms was obtained in both instances. Operative details and illustrative explanations are presented.—*Allan K. Swersie, M.D.*

MISCELLANEOUS

Clinical and Experimental Investigations on the Subject of So-Called Essential Hematuria. (Klinische und experimentelle Untersuchungen zur Frage der sog. essentiellen Haematurie). A. THELEN and H. WIEGERS. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 277: 547.

THE term "essential hematuria" is applied in the absence of an unequivocal cause of hemorrhage. In addition to the typical causes of hematuria (tumor, tuberculosis, calculosis, hydronephrosis, polycystic disease, nonspecific infections, varices, aneurysms, hemangioma) vasomotor disturbances (Israel, 1876), neurovascular disease (Broca, 1894, Klemperer, 1897), and urinary stasis (Lawen, 1923) were regarded as responsible factors of hematuria. Rupture at the fornix and inflammatory changes at the papillocalyceal angle were found to be other causes. Schule and Klose (1925) classified essential hematuria as (1) hemorrhage with demonstrable histologic changes (of the parenchyma, calyces and papillae, kidney pelvis), and (2) hemorrhage without demonstrable histologic changes (disturbances of innervation or circulation and hemorrhagic diathesis).

The number of reports which ascribe essential hematuria to infection is increasing, and Gunther goes so far as to reject any cause of essential hematuria other than pyelitis.

Eight cases observed by Thelen over a 5 year period are presented. The patients suffered from long-lasting profuse hematuria. In 7 the hematuria was caused by nonspecific pyelitis, and in the eighth patient there was an unexplained circulatory disturbance accompanying congenital heart disease. Four patients had nephroptosis, and in a fifth patient this was combined with pregnancy. Nephrectomy was performed in two cases, nephropexy in 1 case, and renal biopsy in another case. Although the patients and the family physician report hemorrhage, many times clinical investigation fails to confirm this. Pain in the lumbar region and some dysuria are usually present. Cystoscopy and ureteral catheterization disclose at first clear urine; suddenly this urine becomes grossly hemorrhagic although the catheter is introduced only to 20 to 22 cm. and does not enter the renal pelvis (this was observed in 2 of the 8 cases). No trauma through lavage can be made responsible for this phenomenon. In another series of 20 cases, similar observations were made by Thelen. Hemorrhage occurred when the catheter remained in situ for 20 to 30 minutes, but sooner in exceptional cases. The preceding interval free from hemorrhage is characteristic. In the series of 20 patients with delayed hematuria on ureteral catheterization, 4 had bacterial pyelitis, 5 had pyelitis without demonstrable bacteria, 4 were suspected of having pyelitis, 3 had a recent history of the passage of a urinary calculus, and 1 had a renal calculus on the opposite side; the remaining 3 patients showed spasticity of the urinary pathways (1 had perirenal inflammation and 1 had a carcinoid of the appendix). Seventeen of the 20 patients suffered from inflammatory processes of the renal pelvis or other conditions of kidney, pelvis, or ureter, in which the examination may have precipitated a latent hemorrhage.

This phenomenon was suspected to be caused by neurogenic factors inasmuch as Griessmann and Eufinger, and Junker reported good clinical results from renal decapsulation or denervation of the pedicle. Griessmann and Eufinger observed in rabbit experiments that gauze pads soaked with various concentrations of saline solution or perioston solution produce hematuria if left from 6 to 72 hours in contact with the renal surface or pedicle. Neurovascular stimuli were shown to be the cause of "essential mucosal hemorrhage" (stomach, intestine, kidneys) in Wachsmuth's experiments (pharmacological), by nerve stimulation and nerve severance.

In order to clarify Thelen's clinical observations, experimental investigations were made on twenty-four rabbits of from 3,200 to 4,000 gm. in weight, and four groups of experiments were done.

1. Griessmann and Eufinger's experiments were repeated. A gauze pad of cherry size was soaked with physiologic saline solution and allowed to remain in contact with the renal surface and renal pedicle for 7 to 24 hours, and in another series it was soaked in 10 per cent saline solution, and allowed to remain for 24 to 72 hours in situ. Urine examinations were done before and after the operation.

2. A No. 4 ureteral catheter was introduced operatively into the lower third of the ureter, 3 to 4 cm. up, without permitting it to enter the renal pelvis. The observation times were at 45 minutes, 1.5 hours, 3 hours, 6 hours, 24 hours, and 48 hours. Routine urine examinations were made before and after operation.

3. The experiment, as in 2, was done with additional anesthesia of the pedicle with 3.5 c.c. of 1 per cent novocaine solution. The survival time was 3.75 hours.

4. Exploration of the kidney in situ versus luxation of the kidney in order to determine its respective changes. All of the animals with the exception of one were sacrificed by means of a blow and 1 was purposely overdosed with pernocton. The urine was subjected to microscopic examination and its sugar and albumin content was determined. The kidneys were cut in such a manner as to present the papilla, fornix, pelvic mucosa, and renal sinus. H. E. Goldner's trichrom, and Lepehne's stains were used.

1a. The authors could not fully confirm the results of Griessmann and Eufinger. Physiologic saline solution had no effect, while the 10 per cent solution of saline solution produced edema and microcytic infiltration of the capsule, moderate interstitial edema of the papilla, and mild dilation of the collective tubules. After 24 hours no hyperemia was found; after 72 hours albumin and erythrocytes appeared in the urine. An effect on the contralateral kidney became evident in the form of edema of the papillae and dilatation of the collective tubules.

2a. Hematuria set in a few minutes after insertion of the catheter consequent to the circulatory disturbances, considered to be reflex in origin. First edema was seen in the papillae, especially between the connective tissue fibers of the interstitium; the lymph vessels were maximally dilated, and the collective tubules were dilated and pushed apart by intervening lymphatic stasis. The mucosa was taut through enlargement of the edematous papilla; early vascular changes occurred with the appearance of juxtanuclear vacuoles in the muscularis, loosening of the periadventitial tissue, and accumulation of serum in the fatty tissue surrounding the vessels and renal pelvis. Because of the great permeability of the vessels, diapedesis of red blood cells occurred in addition to edema, and hemorrhage could be seen in the renal pelvis and collective tubules. Disturbances of blood distribution were indicated by hyperemia in the fornix and anemia of the papilla and renal tissue. In contrast, the blood distribution remained equal in the medulla and cortex of the untreated kidney. After 6 hours the edema and lymphatic stasis increased to such a degree as to cause separation of the epithelium from the basal membrane of the collective tubules with invagination into the lumen. Lymphorrhea into the tissue and parenchymatous defects were caused by rupture of the lymphatics. After 24 hours the hyperemic papilla shows subepithelial and perivascular hemorrhages. Synchronously cellular parenchymal necrosis developed, most marked in the fornix, and was accompanied by microcytic infiltration. After 48 hours the epithelial damage was readily visible, the renal pelvic mucosa was loosened, nuclei absorbed the stain unequally, mitoses appeared and leucocytes were numerous in and below the epithelial layer in the vascular walls and throughout the parenchyma.

Hemorrhage into the renal pelvis, perivascular space, in the fornix (submucosal), and in the collective tubules was visible in every stage. Red cell casts indicated hemorrhage in the collective tubules.

Bacteriologic examination did not indicate infection by pathogenic micro-organisms. Only in 1 experiment were such bacteria found in the renal pelvis, while the region of the fornix remained sterile. In 3 cases saprophytic contamination was observed.

3a. Novocain experiments were equivocal.

4a. No difference was found histologically whether exposure occurred in situ or by luxation of the kidney. Death in pernocton anesthesia failed to produce histologic changes in the kidneys.

The authors believe that the findings were caused neither by urinary stasis nor by rupture of the fornix, but rather by the stimulus of the catheter which lead reflexly to circulatory changes in those parts which have a common embryological origin, i.e., the medulla and papilla (collective tabules), while the renal cortex was spared. Circulatory changes, edema, and lymph stasis led eventually to sclerosis, which can be found in human kidneys removed because of essential hematuria. The findings could be interpreted as Rossle's "serous inflammation," which is not caused by bacteria although it may become secondarily infected. The present theory does not apply to other hemorrhages such as those caused by morbus Werlhof, an over-dosage of anticoagulants, cardiovascular disturbances, and allergic conditions. Nephroptosis may be a contributing factor (present in 4 of Thelen's 8 cases), because the accompanying changes of the ureteral tonus may set off a chain of reactions which lead to circulatory disturbances, edema, lymph stasis, and hemorrhage. The authors tend to explain the hemorrhage associated with renal pelvic calculi and renal tumor on the same basis, namely, a reflex response to a local stimulus. The findings reject primary infection as the cause of essential hematuria which may be precipitated by stimuli even in parts remote from the kidney. —*Ernest Bors, M.D.*

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

The Nosologic Picture of Chronic Osteomyelitis; Etiology, Treatment, and Resulting Conditions (Das Krankheitsbild der chronischen Osteomyelitis; Ursache, Behandlung, und Folgezustaende). CARL BISCHOFBERGER. *Zschr. Orthop.*, 1953, 84: 234.

THREE hundred and thirty patients with chronic osteomyelitis have been observed by the author during the past 15 years. Of these, 268 were discharged as cured (81 per cent). It is well known, of course, that patients with so-called "healed" osteomyelitis may suffer a recurrence in later years; however, in the majority of these patients the condition has been under control for 10 years or more and the expression "cured" seems to be justified. In 238, or 72 per cent of the patients, the radical slope-walled trepanation (walls cut away to form a basin- or troughlike depression), as originally recommended by Neuber, could be carried out, and 218 of these patients (96 per cent) were considered as cured.

There were 14 instances of osteomyelitis of an amputation stump with the so-called coronal sequestrum; here reamputation was done, each time with success. In 16 cases, in which trepanation was not possible, a cure was obtained either by the most radical excochleation, or simply by the removal of foreign bodies (bullets, or splinters of wood). In 11 patients death occurred during, or shortly following, treatment. The remaining 51 patients could not be operated upon with any promise of success.

In general, chronic osteomyelitis is an affection which, as a rule, attacks children and young people. The few older people in this series had had their disease for many years. In the majority of instances the chronic condition was the sequela of an acute hematogenic osteomyelitis. Timely and adequate treatment of the chronic osteomyelitic lesion is frequently neglected.

It is erroneous to believe that chronic osteomyelitic lesions can be cured with massive doses of the modern antibiotics. The deciding factor is the surgical intervention; even so, the result is frequently a severe crippling of the individual and deformity of the affected extremity. The prevention of such crippling deformities is the aim of the modern orthopedic surgeon; however, he must also keep in mind the corrective measures for such deformities as could not have been prevented. —*John W. Brennan, M.D.*

Echinococcosis of Bone (Hidatidosis osea). GARZON ARANDA. *Cir. gin. urol.*, 1953, 6: 603.

A 25 YEAR old male patient had worked since he was 10 years of age as a sheepherder. He had always kept sheep dogs. He had fallen downstairs, striking his right leg on the steps as he fell, was treated by countertraction for 45 days, and wore a cast for 75 days in addition. This resulted in a shortening of 6 cm. in the injured extremity. After this he was free from symptoms, except for a few brief attacks of pain in the hip joint and knee with change of weather, for 18 months. The general condition of the patient during this period remained excellent. Fifteen days before admission to the author's service in the military hospital "del Generalisimo" in Barcelona, Spain, the patient began to suffer renewed pain in the hip joint, and knee, more severe than before and radiating down to the leg. There was a deformity in coxa vara of the upper third of the right femur, with limitation of flexion of the hip joint to 50 per cent of normal. Roentgenological examination disclosed a coxa vara deformity of the upper third of the femur with marked osteolytic manifestations, absence of periosteal reaction, and calcifications in the soft tissues, some of these with circular configuration. The hip joint appeared perfectly normal. The femoral cortex in this region was markedly thinned.

Incision for biopsy purposes over this swollen portion of the upper third of the hip released 700 c.c. of purulent fluid in which were discovered floating vesicles of the Echinococcus. The microscopic examination showed disintegration or necrobiosis of bone and osteoid tissue, and infiltration of inflammatory granular tissue which had invaded and substituted for the medullary marrow spaces with, at some points, a predominance of fibrosis. Scattered throughout the field were cystic formations with germinative and fibrous capsules. The diagnosis was echinococcous involvement of the femur complicated by pathologic fracture and ossifluent pseudo-abscess.

Since the author believes that once the parasite has invaded the bone the entire bony structure is always lost, he advised amputation by exarticulation at the hip. This operation the patient refused; however, later, at another hospital, he submitted to an operation which he stipulated was to consist of excision of the cystic area of the femur with substitution of an acrylic prosthesis. When the field was exposed, however, the hopelessness of the condition was appreciated and exarticulation was attempted. The patient did not survive the operation.

The author does not believe that roentgenology is always sufficient for diagnosis; especially in cases in which inflammatory processes have become engrafted upon the original echinococcal process. Nevertheless, with the aid of all clinical means and, perhaps, biopsy the diagnosis should never be missed. Characteristic of echinococcosis are the lack of evidence of defensive reaction on the part of the infested bone tissue, the tendency to involvement of the diaphysis near the joint cartilage (most opulent blood supply), but without involvement of the joint itself, and, of course, the peculiar specific indices of the echinococcal infestation itself. A marked difference between echinococcosis of the bone and that of other organs is the fact that in the bone itself it does not form a capsule in the absence of secondary infection, the echinococcal membrane being directly applied to the bone tissue. —*John W. Brennan, M.D.*

The Pathogenesis of Idiopathic Scoliosis. ALADÁR FARKAS. *J. Bone Surg.*, 1954, 36-A: 617.

HUMAN gait not only causes physiological scoliosis but aggravates and initiates it in paralytic scoliosis and after thoracoplasties. Idiopathic scoliosis can be summarized briefly as a diminishing resistance of the spinal column to compression and rotation. These forces are enormously exaggerated during gait. In structural scoliosis, on the other hand, the spine penetrates the adjacent spaces, regardless of movement of head, shoulder girdle, trunk, and pelvis. No movement or maneuver can avert true scoliosis. Physiologic scoliosis is present from the age of 5 years and becomes progressively worse with the passage of time.

Scoliosis has four roentgenographic characteristics:

1. Penetration occurs in the frontal plane. It is a complex displacement of one or more vertebrae in the space surrounding it, i.e., in the thoracic area or in the pelvic cavity, for which there is no panacea at present.

2. Articular contracture in lateral deviation involves capsular and ligamentous apparatus about the apophyseal joints. It is a condition that is most amenable to corrective measures.

3. Rotation of the vertebrae, exclusive of rotation of shoulder girdle, thorax, and pelvis.

4. Compression of the vertebrae on the concave side of the curvature, which thus far has not been amenable to any form of therapy, is primarily characteristic of idiopathic scoliosis in the thoracic spine.

In healthy bone, increased pressure produces osteosclerosis, or condensation. Unilateral increased pressure upon a vertebra becomes denser on the side of increased pressure; however, under certain pathological conditions such as rickets, Paget's disease, etc., compressibility ensues from a temporary inability to form a desirable denser trabecula to protect its own integrity. Vertebrae have an unusual capacity to withstand pressure. Formidable components which enhance the solidarity of the vertebral column are: disc with its nucleus pulposus, cartilaginous plate, vertebral cortex, and epiphyseal rings.

Etiologically, the abnormal relation of vertebral body from its cancellous portion is predicated upon a diverse predisposing phenomenon and a mechanical component, namely, the superimposed weight-bearing which precipitates scoliotic deformity in the thoracic spine. Separation may be preceded by the so-called infantile osteoporotic spine. Flattening and collapse of a vertebra may also ensue from failure of fusion of the epiphyseal plate or weakened vertebral cortex such as may be noted in rapid growth of a child. The author observes, moreover, that idiopathic scoliosis of the thoracic spine originates in the cervicothoracic area. Subsequently, penetration and lateral movements are partly due to subluxation in the intervertebral articulations.

The lumbar form of idiopathic scoliosis consists of articular contracture and rotation. Here fusion is earlier, epiphyseal rings are much bulkier, thicker, and wider than in the thoracic spine. Because of the above mentioned formidable barriers, the lumbar spine yields negligibly to penetration and compression. Derotation and even over-correction of the convexity is rendered more amenable than in the thoracic spine. Allusion is made to the disappearance or decrease of the lumbar curve as being attributable to lumbar idiopathic scoliosis.

The article is replete with many pertinent and illustrative roentgenographs and appropriate bibliographic references; it should be read in its entirety by those who are interested in the subject of scoliosis.

—*Samuel L. Governale, M.D.*

Synovial Sarcoma of the Tibia. J. DOUGLAS HICKS. *J. Path. Bact.*, Lond., 1954, 67: 151.

THE author presents 2 cases of primary synovial sarcoma of the tibia. One of these presented features identical to "adamantinoma" of the tibia. The author presents a convincing thesis concerning the similarity between the two tumors and the theory that all tumors previously diagnosed "adamantinoma" are actually primary synovial tumors. The epithelial features of the adamantinoma, in places, are pseudoepithelial inasmuch as they resemble the "epithelial" cells lining the clefts of true synoviomas. The squamous features and basal cell features are derived from these cells by metaplasia.

As to the origin of primary synovioma of the tibia, the author states that he has seen examples of bone cysts which were lined by tissue resembling synovial tissue; furthermore, he believes that tumors of bone are capable of great pleomorphism and that it is reasonable to expect differentiation toward a tissue which is closely allied (synovial tissue) to bone both embryologically and anatomically. The majority of these tumors have been limited to the tibia but have been described in other bones (ulna and femur).

—*Daniel H. Levinthal, M.D.*

Ischiopubic Osteochondritis (Osteocondrite ischiopubica). R. LODI. *Chir. org. movim.*, 1953, 39: 118.

FIVE cases of ischiopubic osteochondritis of the ascending ramus of the pubic bone at about the point of its symphysis with the ischium are reported. Delitala first described this condition in 1923 and noted that the lesion tends to heal spontaneously or under simple orthopedic management. A series of 10 roentgenographic reproductions in the original text renders the lesion and its course toward healing in a period of about 1 year obvious. All the patients were boys from 6 to 11 years of age, which supports the theory that the affection is one involving the cartilage of conjugation at this point; this symphysis closes from the sixth to the twelfth or thirteenth year of age.

In 1 instance there was a history suggesting a tuberculous condition and in 2 cases there was a suggestion of lues. However, in none of these could the condition be verified by the usual studies.

In all these children except 1, in whom the condition was silent and found by accident, there were pains referred to the lumbosacral region or hip, a peculiar eversion and flexion (to about 30 degrees) of the thigh, and some limping. The pains became worse with exercise, yet there was no evidence of specific trauma, and the author believes that any trauma or muscular exertion produced at most a secondary or precipitating effect.

There were in this material no bilateral lesions; however, there was always a nodular swelling on the

other side of the pelvic arch at the homologous point, representing roughly the attachment of the adductor muscles.

In every instance, after a few months to a year, the symptoms and the roentgenologic findings had entirely disappeared, leaving a normal roentgenologic appearance of this portion of the skeleton.

The author notes the various hypotheses which have been given to explain the pathogenesis of the symptoms and findings in such children; he particularly notes, among others, the opinion of Phemister—that the affection has something to do with the well known growing pains, or "growth fever" of children, and that there is some sort of chronic infection involved in its pathogenesis. Yet the author himself does not attempt to express an opinion with reference to the cause or pathogenesis, as he believes that many more studies will be necessary before such an opinion can be conclusive. One of the boys in this material gave the impression that an endocrine disturbance was present in the guise of a dystrophia adiposogenitalis and he was given hormonal treatment. However, the condition would probably have healed anyhow.

Finally, the author expresses the opinion that the condition, even the bilateral condition, occurs more frequently than is generally thought.

—*John W. Brennan, M.D.*

Ollier's Disease; Kast Syndrome (Maladie d'Ollier; syndrome de Kast). FÈVRE and ALPTEKIN. *Rev. chir. orthop.*, 1954, 40: 15.

THE authors present a case of dyschondroplasia which was carefully followed up for 22 years. The patient was first seen at the age of 11 years, when she had scattered islands of cartilaginous tissue in the bones of the right lower limb, right ilium, right humerus, and right hand. The process was unilateral. These lesions were associated in this patient with several hemangiomas located in the subcutaneous tissues of the right foot. The association of the dyschondroplasia with hemangiomatous formations has been called the "Kast syndrome" by several authors.

During the prolonged follow-up of this patient it was noted that the dischondroplastic lesions became arrested and partially regressed. However, the enchondromas of the fingers continued to increase.

The patient had 5 normal children, indicating that the disease in this case was not hereditary.

—*Fernando Aleu, M.D.*

Secondary Chondrosarcoma. BRADLEY L. COLEY and NORMAN L. HIGINBOTHAM. *Ann. Surg.*, 1954, 139: 547.

THE authors review a series of 52 cases of secondary chondrosarcoma with a minimum follow-up of 5 years. The term "secondary chondrosarcoma" is used to designate malignant transformation of benign cartilage tumors such as central chondroma (enchondroma), peripheral chondroma (osteochondroma), dyschondroplastic tumors (as occur in Ollier's disease), and Codman tumor which has come to be known as a benign chondroblastoma. Malignancy should be suspected when pain is experienced in a previously symptomless growth, or when the tumor increases in size, or when roentgenographic examination reveals changes which suggest malignancy.

When the pathologist reports "chondrosarcoma" on examination of a biopsy specimen, one can be assured that sarcoma already exists; however, when the biopsy report is "chondroma" the lesion should still be regarded with suspicion and clinical and roentgenographic examination should take precedence over microscopic examinations. In all cases in which cartilage tumors are resected, the pathologist should study carefully the gross material and cut sections from various portions of the specimen.

When the benign cartilage tumor is first discovered, complete surgical removal in reality constitutes cancer prevention, while incomplete removal does not eliminate the possiblity of future malignancy.

Surgery is the only treatment for chondrosarcoma. This implies complete removal of all diseased tissue, and generally entails amputation. The prognosis for long term survival in the case of secondary chondrosarcomas is far more favorable than is the prognosis in osteogenic or primary chondrosarcomas. If all cases of secondary chondrosarcoma were eliminated from the group of so-called osteogenic sarcoma, which in many clinics includes chondrosarcoma, the 5 year survival rate of the remainder would be markedly lowered. A 5 year follow-up of a secondary chondrosarcoma does not have the same prognostic significance for survival as for an osteogenic sarcoma; a 10 year follow-up is considered a more significant period.

The authors plead for a more aggressive treatment of benign tumors of cartilage, for earlier realization of the tendency to insidious transformation to chondrosarcoma, and for prompt and thorough surgical treatment once the malignant phase has been recognized.

—*Norman J. Rosenberg, M.D.*

The Syndrome of Stenosing Tendovaginitis of the Flexor Carpi Radialis. MICHAEL BURMAN. *Bull. Hosp. Joint Dis.*, N. Y., 1953, 14: 278.

THE author reports 10 cases of stenosing tendovaginitis of the flexor carpi radialis. In 7 of the patients, the lesion was an isolated one and in 3, it was found in association with other similar compressions at the wrist joint. The cause of stenosing tendovaginitis is listed as (1) direct injury, (2) occupational stretching of the tendon, or (3) pull on the tendon by contraction of the muscle powering the tendon.

None of the cases was associated with any triggering or locking of the tendon. The wrist was usually painful and weak, and the tender spot was a point of ball-shaped thickening of the tendon sheath near the scaphoid tuberosity where the tendon entered its tunnel. The 10 cases reported showed improvement after surgery which consisted of freeing the constricting sheath.

—*Edgar L. Ralston, M.D.*

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Surgical Treatment of Acute Osteitis in Childhood. A. E. BREMNER, G. A. NELIGAN, and C. K. WARRICK. *Lancet*, Lond., 1954, 1: 953.

OF 96 patients admitted to the hospital under the authors' care, 23 satisfied the criteria for inclusion in the trial of treatment. Consecutive cases were treated alternately: (a) by open operation, including drilling

of the bone; (b) by a more conservative method, with reliance on aspiration of pus from the subperiosteal abscess as the sole surgical measure.

The main criterion for assessing the results was the duration of disability after treatment was started. By this criterion there was no significant difference between the results obtained with the two methods, and no important difference was found in respect to any other criteria.

Because of the intrinsic advantages, the conservative methods were selected for routine use; however, the successful application depends on good clinical judgment and on daily reassessment in the early stages of the disease.

The results obtained indicated that the principles could be applied to lesions of short or flat bones.

The following criteria were used in the selection of material: age—2 to 12 years; grade—severe; duration on admission—48 to 168 hours; bone involved—major long bone of a limb; treatment before admission—no antibiotics; organism—sensitive to penicillin.

The clinical indications for local intervention are the presence of signs of a subperiosteal abscess. The abscess is likely to be present in any severe case of acute osteitis in which treatment has not been started within 48 hours of onset. When these indications are present it is a matter of some urgency to evacuate the pus, and this should be done within 24 hours of admission or as soon afterwards as the abscess can be accurately located.

There appears to be no certain advantage in open operation with drilling of the bone; the results were equally as good in cases treated by thorough aspiration of the subperiosteal pus, repeated when necessary.

Fluctuation on ordinary clinical examination, when the pus is in a tense collection deep to the exquisitely tender periosteum, is difficult to elicit. A subperiosteal abscess is likely to be present in any severe case of acute osteitis in which penicillin treatment has not been started within 48 hours of the onset of pain. If, in such a case, the tenderness extends along the shaft of the bone well beyond the limits of the affected metaphysis, with swelling of the overlying tissues, the assumption is that this extension of the tenderness is usually produced by extension of the pus deep to the periosteum. If the patient is then examined under heavy sedation, so that the tenderness is eliminated, the fluctuation is usually detectable. In this way the presence and the position of the abscess can be determined with certainty in the great majority of cases and the site of the aspiration planned accordingly. The aspiration is repeated as a fluctuant collection of fluid reaccumulates, or until the aspirated material is sterile on culture.

—*C. Fred Goeringer, M.D.*

Late Results in the Treatment of 100 Cases of Acute Hematogenous Osteomyelitis. J. Trueta and J. D. Morgan. *Brit. J. Surg.*, 1954, 41: 449.

One hundred cases of hematogenous osteomyelitis were treated at the Nuffield Orthopedic Centre, Oxford. Upon admission of the patient an accurate estimate of the site and intensity of the bony tenderness was made. Blood culture was done and the white cell count and sedimentation rate were determined. The affected part was immobilized and elevated. One million units of penicillin were administered each day. Unless the tenderness had lessened within 24 hours, the patient was prepared for operation under general anesthesia.

A clear surgical field was insured by the use of the pneumatic tourniquet whenever possible. The skin incision was made over the area of maximum tenderness. The periosteum was split and the subperiosteal abscess was evacuated by suction or dried out with absorbent swabs. Several small perforations were made through the cortex with a drill to relieve tension. The tourniquet was removed, hemostasis effected, 200,000 units of penicillin powder sprinkled into the wound, and the skin only was closed (without drainage). Penicillin was given for 3 weeks and the treatment was then reviewed. Immobilization was maintained for as long as signs of bone inflammation persisted.

Early diagnosis is one of the most important factors in the successful treatment of this disease. If treatment begins after the blood supply has been interrupted, i.e., when pus has collected subperiosteally, penicillin alone cannot prevent permanent bone changes. Early surgery now, as in prepenicillin times, plays a decisive part in preventing necrosis of the cortex and cavitation and sclerosis within the bone. With proper surgical treatment avascular areas of the shaft of the bone, which seem to evolve toward sequestration, are spontaneously revascularized and fuse with the rest of the bone without the need for further surgery.

Prolonged follow-up with roentgenological control is essential for determining when the end of the process is reached. Among the 100 cases reported, complete bone healing has so far been obtained in 66.

—*Kenneth E. Sherman, M.D.*

Results of Treatment of Tuberculosis of the Bone and Joints. Critical Evaluation of the Influence of Coli-Vaccine, Conteben, PAS, Streptomycin, and Neoteben in 410 Patients, with Particular Consideration of the Limitations of Chemotherapy (Behandlungsergebnisse der Knochen-und Gelenktuberkulose. Kritische Untersuchung der Beeinflussung mittels Koli-Vakzine, Conteben, PAS, Streptomycin und Neoteben bei 410 Patienten unter besonderer Berucksichtigung der Grenzen der Chemotherapie). Alfred Katthagen. *Zschr. Orthop.*, 1954, 84: 516.

It is important to bear in mind that bone and joint tuberculosis is only a part of a general disease. Even though the pulmonary lesion may not be clinically manifest, tubercle bacilli may settle in the bones and joints once the resistance of the body has decreased (autogenous reinfection). It is quite possible that the first tuberculous lesion had healed and the patient had been reinfected (exogenous reinfection).

Malluchea reported that sulfonamides had a beneficial effect on tuberculous sinuses which showed evidence of mixed infection.

Coli vaccine therapy was used in "closed" tuberculous bone and joint infections and open lesions (with sinuses), but there was no evidence to substantiate the optimistic reports of the originator (Hassey) of this method of treatment.

In cases in which streptomycin (large doses) and neoteben were used it became apparent that, in

spite of the chemotherapy, synovial tuberculosis continued its progress without showing any decrease of its activity. However, the patients who were treated with these drugs felt subjectively better; on the average they were treated for about 9 months.

Conteben was used in several doses and it was found that in many patients complications occurred. These consisted of leukopenia (down to 3,000) in several cases, nausea, erythema, and headaches.

Para-aminosalicylic acid occasionally caused stomach upset. Neoteben, as a rule, was better tolerated than the other drugs.

Many years ago Calvé pointed out that the inconsistent results of the treatment of tuberculosis were predominantly due to the inconsistency of the treatment. It is the author's opinion that patients who have large foci of infection should have treatment in institutions for an average of 3.7 years. Max Lange stated that the most effective treatment of tuberculous spondylitis consists of immobilization and open air therapy. The author also observed that meningitis with fatal results is more often found in "closed" bone and joint tuberculosis than in patients who showed mixed infection. At least 6 of 173 patients treated by chemotherapy were saved whereas without it they could not have been saved.

The indications for operative procedures are the same in spite of the availability of powerful chemotherapeutic preparations, but the prognosis of bone and joint tuberculosis is improved by the use of these drugs. —*George I. Reiss, M.D.*

The Surgical Treatment of Pectus Excavatum (Funnel Chest). E. F. Chin and Richard H. Adler. *Brit. M. J.*, 1954, p. 1064.

Pectus excavatum is a depression deformity of the anterior chest wall that has been recognized under a number of names: funnel chest, trichterbrust, chonechondrosternon, koilosternia, and others. Despite the considerable literature on this well known entity, many differences exist concerning its development and management. A brief review of the current concepts and the results of surgical treatment used in this unit are presented.

The exact etiology is still uncertain. Of the many theories advanced none could serve as a fit basis of treatment until Brown (1939) demonstrated that the deformity was due to a short central tendon of the diaphragm. Brodkin (1951) observed a diminished inspiratory sternal retraction on the homolateral side following procaine injection of the phrenic nerve. The authors have noted an almost complete disappearance of inspiratory sternal retraction when the diaphragm has been paralyzed with curare. It does seem likely that some congenital abnormality of the diaphragm is primarily responsible for the condition.

Unfortunately, it often tends to progress to a permanent bony deformity and there is no way of knowing in which individual this will occur. In 1 of these cases, it progressed from a mobile deformity seen only on deep inspiration to a fixed deformity in a period of 6 months. The deformity is often symmetrical, but not always so. In time a characteristic posture develops. The ribs acquire a lateral flare and the chest becomes flattened and pulled down upon the abdomen, a dorsal kyphosis develops, and the head tends to protrude forward. The costal cartilages dip into the sternum at a steep angle and the xiphoid is often impalpable from the overcrowding of the sixth and seventh cartilages. The depression, which is often extreme, usually deepens on inspiration.

The purpose of surgical treatment is to correct the sternal and costal cartilage deformity. This is of no value unless persistent post operative supervision is carried out to see that the patient corrects the kyphosis, which is, of course, secondary to the diaphragmatic and sternal abnormality. The younger the patient, the easier this is to do. The authors are reluctant to operate on patients over 20 years of age unless they have symptoms. There is no doubt that these symptoms will be relieved in this older age group, but the bad posture will probably persist.

The extent of the deformity in each individual must be carefully assessed clinically and at operation in order to ensure complete removal of all deformed costal cartilages. No harm follows accidental opening of the pleura with an endotracheal tube in place. The lung is kept inflated, the pleura is closed, and any small remaining pneumothorax is allowed to absorb.

The technique of the operation is described. Case reports are outlined in 4 instances. A total of 9 cases in all indicates satisfactory results, and no complications have arisen. —*C. Fred Goeringer, M.D.*

Epiphysiodesis for Early Slipping of the Upper Femoral Epiphysis. Clarence H. Heyman and Charles H. Herndon. *J. Bone Surg.*, 1954, 36-A: 539.

Among orthopedic surgeons there exists a general agreement that slipped femoral epiphysis requires corrective measures. What they do not agree upon is the type of treatment. Hence, the authors have reviewed many of the past and present therapeutic measures of this disabling deformity and, after careful evaluation of these, they endeavor to introduce bone grafting of the femoral epiphysis to facilitate fusion. While nailing in situ prevents further slipping of the femoral epiphysis, it fails to stimulate or hasten epiphyseal fusion. Badgley, Wagner, Klein, and the staff at the Campbell Clinic are but a few of the many authors who attest to the poor results achieved by nailing of the slipped epiphysis. Moreover, progressive degenerative changes, pain, and limited motion have been observed with nail fixation.

The authors operated upon 10 patients during the period from 1943 to 1949 with excellent functional and roentgenological results. They confess, however, that Howorth had previously operated upon a much larger series of patients in whom he attained epiphyseal fusion within 3 months.

The end results of 19 epiphyseal fusions were independently and objectively studied by Herndon. His findings were as follows: (1) the average age of patients was 13 years; (2) average period of postoperative observation, 2.7 years; (3) 13 patients were males, 2 were females; (4) all patients limped and had limited motion; (5) 17 patients had minimal slipping, 2 had severe slipping; (6) partial weight-bearing was permitted at 10 weeks postoperatively and full weight-bearing was permitted at 15 weeks; (7) x-ray evi-

dence of fusion averaged 2.3 months, the shortest period being 4 weeks and the longest, 4.5 months. It is of interest to note that the age of the patient bore no relationship to the rate of epiphyseal fusion. The roentgenologic and functional results were all graded as excellent. In no case has there been any progressive displacement. Trabeculation, density of fusion, and the smoothness of the articular surfaces have been superbly achieved.

The operation consists of a cancellous bone (ilium) transplant traversing the epiphyseal plate through a window in the neck of the femur.

—*Samuel L. Governale, M.D.*

Treatment of Cut Flexors. A. SANTOS PALAZZI. *Acta orthop. scand.*, 1954, 23: 198.

THE author advises delay of definitive repair of all injuries of the flexor tendons until all danger of contamination is past. Only in those cases in which there is no danger of infection is primary suture advocated. No suture is advocated in the area of the flexor tendon sheath.

In repairing the tendon, the sublimis is usually sacrificed and the proximal end is sutured to the profundus tendon. It was found that a tendon graft is necessary in any case that goes beyond 2 months from the primary injury. The graft used is preferably taken from the sublimis. If this is not possible, then the palmaris longus or one of the toe extensor tendons is used.

Care is taken to reconstruct pulleys in the fingers, with a free tendon graft if necessary. The digital nerves are repaired with tantalum wire if necessary.

The most frequent complication has been the formation of adhesions. The author advises re-exploration and freeing of the adhesions if they do not respond to the usual conservative methods.

—*Edgar L. Ralston, M.D.*

Spontaneous Rupture of the Extensor Tendons at the Wrist Joint. N. V. ADDISON. *Brit. J. Surg.*, 1954, 41: 511.

SPONTANEOUS rupture of the tendons of the extensor digitorum communis due to attrition on the dorsum of the hand and wrist is a rarity. One of the reasons for the absence of recorded cases may be that rupture of only one of these tendons usually causes no great disability.

The rupture of the extensor pollicis longus due to attrition at the wrist joint is a common complication of old fractures at the lower end of the radius. It may also follow rheumatoid arthritis. It is the belief of many authors that spontaneous ruptures do not occur unless the tendons are diseased. Definite pathological tendon changes are found to occur in rheumatoid arthritis.

Chronic inflammatory conditions such as syphilis, or toxic changes from alcoholism and diabetes mellitus may produce degeneration and necrosis of the muscles and tendons. Certainly the presence of tuberculous tenosynovitis leads to disease of the tendons and to their fragmentation.

Two cases are presented by the author and successful surgical treatment is described.

—*Kenneth E. Sherman, M.D.*

The Surgical Treatment of Flexor Tendon Injuries in the Hand; Results Obtained in a Consecutive Series of 57 Cases. J. B. KYLE and A. L. EYRE-BROOK. *Brit. J. Surg.*, 1954, 41: 502.

THE treatment of flexor tendon injuries, the results of which were once universally bad, has shown steady improvement in the last 30 years. A follow-up study is presented of patients treated over a period of 6 years by one surgeon. The technique evolved is described.

The insertion of a graft is the method preferred when the tendons are divided within the finger itself, or when a section of the tendons has been destroyed. Initial treatment is the simplest possible and consists of cleansing the wound and suturing the skin. The aim is to obtain primary healing with the minimum of scarring. An interval of 6 weeks is allowed to elapse before the tendon is grafted. Preoperative physiotherapy insures the fullest possible range of passive movement.

The operation is done in a bloodless field, obtained by a pneumatic cuff. The tendons are exposed in the finger through a true lateral incision in its whole length. The distal remnants of the sublimis and profundus tendons are discarded. The tendons are exposed in the palm through a curved incision in or parallel to the oblique palmar crease. The proximal remnant of the flexor sublimis tendon is preferred as the source of the graft. The profundus tendon is divided cleanly immediately distal to the lumbrical origin. The graft is threaded on a tendon carrier and drawn through from the palm into the finger under the metacarpal sling. It is probably best to complete the distal attachment of the graft first. As the sublimis and profundus tendons are of equal caliber, an end-to-end suture is performed proximally. An exact end-to-end apposition with no unsatisfied fibers is obtained. The skin is sutured with nylon. No buried sutures are used. The cut edges of the tendon slings in the finger will be approximated as the skin is sutured. Early movement is not stressed. Too early activity will not insure gliding but on the contrary will lead to increased reaction.

Indications for using the palmaris longus tendon as the graft are: (1) destruction of part of the flexor sublimis, and (2) the necessity for utilizing a graft in the little finger when the flexor sublimis tendon is too thin and frail to be suitable. A generous supply of paratenon should be removed with the palmaris longus tendon. This can be accomplished through three short transverse incisions, one over its insertion, one at the musculotendinous junction, and one midway between. The resulting scars are inconspicuous. The steps in the operation are identical with those previously described for sublimis grafts with the exception of the proximal suture. The more slender palmaris longus is woven through two slits in the flexor profundus tendon, and its free end is firmly embedded in the substance of the profundus. This method was originated by Pulver Taft.

If neither flexor digitorum sublimis nor palmaris longus is available, the extensor digitorum longus to one of the three middle toes offers the most readily available graft.

End-to-end suture of the flexor profundus is the method preferred if the flexor tendons are divided in the palm of the hand proximal to the finger tendon

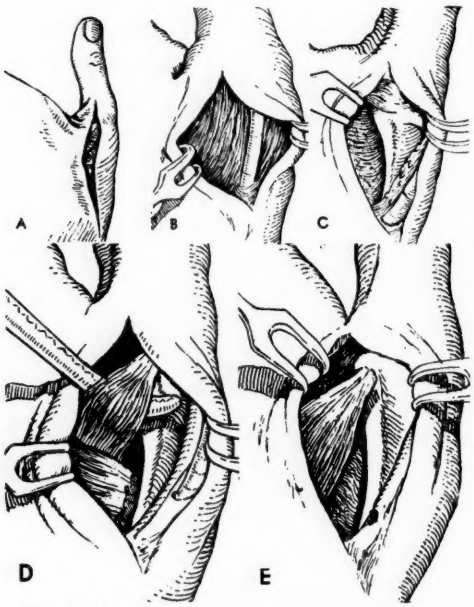

FIG. 1 (Burman). Operative technique. *A*, Incision; *B*, isolation and ulnar retraction of extensor pollicis muscle; *C*, stripping of area of origin of first dorsal interosseous muscle from first metacarpal bone; *D*, combined exposure of tendons in distal part of wound, curved Kelley clamps passed beneath conjoined tendon, which is then cut on spread blades of clamp; *E*, operative wound ready for suturing.

sheath. This is performed as a primary operation if the wound is a clean one. Sacrifice of an intact sublimis tendon should not be entertained however. It is considered that the function of a finger with such intact sublimis tendon alone may fall little short of the average result to be obtained from a grafted flexor profundus. The range of movement after repair of a cut flexor pollicis longus tendon is often disappointing. Yet functionally the results are uniformly good. The simpler procedure of primary repair is preferred therefore unless there is some contraindication such as destruction of a portion of the tendon.

A complete assessment of the results is given, including the failures. "Unsatisfied fibers" and excessive formation of scar tissue were the most common causes of the latter. These can be avoided to a large extent by using approved methods and careful technique. The best chance for a good result after any flexor tendon injury follows exacting care at the initial operation for repair. The result of tenolysis, for example, is likely to be more successful after a simple suture in the palm than after a tendon graft. Familiarity with the detailed anatomy of the operative field enables the surgeon to make a direct approach in his exposure and this results in the minimum of scarring. It is only by performing a considerable number of operations that the surgeon can expect good results.—*Kenneth E. Sherman, M.D.*

Release of Adduction Contracture of the Thumb. MICHAEL BURMAN. *J. Internat. Coll. Surgeons*, 1954, 21: 584.

ADDUCTION contracture of the thumb occurs in three of the four groups of acquired hand disabilities, that is, the spastic, the arthritic, and the traumatic. It is almost never associated with infantile paralysis or ulnar nerve palsy, but it is sometimes observed in cases of Erb's palsy.

The thumb is held near the side of the index finger in the plane of the hand, the movements of extrinsic abduction (abduction in the plane of the hand) and of opposition are limited. There is sometimes a comparable contracture in a plane a little forward of the plane of the hand, to which is joined opposition position of the thumb and intrinsic deformity of the thumb (pseudo-adduction contracture of the thumb). Adductor dominance in time causes abductor weakness, the mild deformity of pollex valgus, and ulnar sesamoiditis, for the ulnar sesamoid bone of the thumb is placed in the tendon of insertion of the adductor muscles.

The first dorsal interosseous muscle, a secondary adductor of the thumb, is stripped from the first metacarpal bone, and the combined tendons of insertion of the two adductor muscles are cut. Section of the latter alone does not fully overcome the contracture. Full passive spread of the thumb is the sine qua non for any operation to obtain active opposition or abduction of the thumb.

The technique of operation is outlined step by step and illustrated. Alternative procedures are the manual stretching of the adducted thumb, which, if successful, obviates the need of operation, and subcutaneous tenotomy of the tendon of insertion of the adductor muscles.

Reports of 8 cases are outlined, but 13 cases were included in the material. —*C. Fred Goeringer, M.D.*

FRACTURES AND DISLOCATIONS

The Influence of the Total Hormone Preparation of the Anterior Lobe of the Hypophysis, Locally Injected, in Instances of Retarded Osseous Union (L'influenza dell'ormone anteipofisario totale iniettato in loco nei ritardi di consolidazione ossea). E. JANNELLI, A. MIGNOGNA, and L. FRIZZI. *Gior. ital. chir.*, 1954, 10: 129.

TEN cases of retarded osseous consolidation were treated by means of intrafocal injection of the anterior hypophyseal preparation antefisan at 10 day intervals. The usual dose was 3 c.c. (10 units). To prevent deviation of the injected fluid into the surrounding tissues the Hagedorn needle was used.

The ages of the 10 patients ranged from 8 to 43 years. The intervals elapsing after the injury until the beginning of the intrafocal hormone therapy ranged from 75 days to 1 year. The periods of treatment required after initiation of the hormone therapy was from 20 to 60 days. All of the patients had fractures of the long bones of the arms or legs except 1 with a fracture of the fifth metacarpal.

There was 1 instance in which the fracture failed to consolidate under the treatment; however, this was an

old shotgun fracture of the humerus with shotgun slugs still scattered about in the soft tissues and numerous comminuted fragments, and the nerve trunks to the limb were injured. Finally, the patient refused further treatment and left the service after 70 days.

A future report will deal with the experiments now in progress which were instituted with the hope of elucidating the mechanism of action of the intrafocally injected hormone preparation.

—*John W. Brennan, M.D.*

Results with Open Reduction and Intramedullary Nailing of Fractures and Nonunion of the Shaft of Long Bones; 200 Observations (Résultats obtenus dans le traitement des fractures et des pseudarthroses des os longs par l'enclouage centromédullaire à ciel ouvert; a propos de 200 observations personnelles). RENÉ FONTAINE, JEAN-NICOLAS MÜLLER, and ABEL SIBILLY. *Rev. chir.*, Par., 1954, 73: 1.

A PLASTER cast after fixation is necessary unless the fixation is very firm, without possibility of rotation. With the advent of penicillin and careful surgical technique, the authors do not fear to open the fracture site if this simplifies the reduction.

Intramedullary fixation is used only if this is the most stable internal fixation. The authors think that the healing of the fracture will be faster if the fragments are perfectly reduced and especially firmly impacted. The Kuentscher nail seems to be the best fixation for this purpose from the mechanical point of view, especially if early weight bearing can be resumed as is the case for the tibia and the femur.

Because of the absence of this compressive force, results are not as striking in fractures of the upper extremity.

The authors do not believe that there is any biological interference by the nail with the healing process.

Seven nonunions of the clavicle as well as 9 fresh fractures united in a few weeks.

For the nonunions of the humerus an onlay graft in combination with the nail seemed to be indicated (average time of union was 4 months). For fresh fractures of the humerus with difficulties in reduction, the Kuentscher nail seems to be very good (2 months before union) but a cast is usually applied.

For fractures of both bones of the forearm other means of internal fixation may be indicated. Only 1 nonunion of the ulna occurred among 15 cases. Insufficient approximation of the fragments was the cause. In all other cases union was obtained in 2.5 months. Fifteen cases of nonunion of the forearm were treated. The intramedullary nail was always combined with a bone graft in these cases. Eight cases of shortening of the forearm for Volkmann's contracture are included in this number. The average time before union occurred was 4 months.

In fracture or nonunion of one bone of the forearm the Kuentscher nail gave good results. This procedure was often combined with shortening and fixation, by means of a nail, of the other bone.

For fractures of the femur the intramedullary nailing seems to be the treatment of choice because of the early mobilization which is possible. Of 40 patients, 1 died because of heart failure postoperatively. There was 1 case of infection after a difficult closed nailing. In a third case an oblique fracture of the femur was not held firmly enough and no union was obtained after 5 months. The intramedullary nailing seems to be the best way to fix nonunion of the femur, but a bone graft is often used with the nail.

In 54 fractures of the tibia which were treated with nails 48 results were excellent and 6 were poor. Of the poor results, 2 were in open fractures, 1 fracture became infected, and 3 closed fractures did not unite. In all but 1 of 14 cases of nonunion of the tibia in which an additional bone grafting procedure was performed healing occurred within 4.5 to 5 months; in the remaining case the nail broke at the site of the fracture.

—*Joseph C. Mulier, M.D.*

The Treatment of Infection After Medullary Nailing. J. ALBERT KEY and FRED C. REYNOLDS. *Surgery*, 1954, 35: 749.

POSTOPERATIVE infection occurs more frequently after medullary nailing than it does after other major surgical operations. The authors advance several reasons for this: (1) wounds of the buttock and lower extremities are more likely to become infected than are similar ones elsewhere; (2) the skin over the area operated upon may be in poor condition, especially if the extremity has been in traction or in a cast for some weeks, or pressure sores may be present; (3) the tissues have been traumatized and some of them are devitalized, and the wound may contain pieces of devitalized bone; (4) the operation may be quite traumatic, and this is especially true if excessive shortening has occurred or if the operation is performed by a surgeon who is not skilled in this procedure; (5) a large foreign body is left in the wound; (6) the patient may be anemic or debilitated from hemorrhage, shock, or prolonged rest in bed, or he may be suffering from some other disease such as cancer, and the operation may be undertaken as a lifesaving or palliative measure; (7) the fracture may be a fresh compound fracture or one in which the wound has been closed and may have been contaminated or even infected, or it may have been mildly infected by a previous unsatisfactory operation for open reduction with or without internal fixation; (8) hematomas are especially likely to develop in the wound after the insertion of a medullary nail, and these may become infected; (9) a nail which is too long or one which has migrated may erode through the skin and thus become infected.

From their experience, the authors advocate a careful check of each patient postoperatively and at the first signs of infection the wound should be inspected and, if necessary, widely opened and loose bone removed, but not the nail, and vigorous treatment of the infection instituted. Such early treatment may abort or eradicate the infection before the bone is involved and permit the fracture to heal in the usual manner.

If the bone becomes infected the sequestra should be removed when discovered, but the nail should be left in place until union occurs because immobilization, which it affords, is a valuable asset in limiting spread of the infection and promoting healing of the fracture. In such cases the treatment is similar to that now used in the treatment of chronic osteomyelitis.

FIG. 1 (Franz, Morisi).

If the infection spreads up and down the track of the nail and this becomes loose and inefficient it should be removed and the fracture treated as an infected compound fracture with or without union.

—*Daniel H. Levinthal, M.D.*

Contribution to the Study of Isolated Traumatic Luxations of the Radial Capitulum (Contributo allo studio della lussazione traumatica isolata del capitello radiale). A. FRANZ and M. MORISI. *Chir. org. movim.*, 1953, 39: 138.

NINE patients with isolated traumatic luxation of the capitulum of the radius were the material for this review. The patients were received at the Rizzoli Institute of the Orthopedic Clinic of the University of Bologna, Italy, during the past 50 years. Excluded from the material were, of course, those instances of dislocation of the capitulum which were complicated by fracture of the ulna (Monteggia fracture), head, neck, or diaphysis of the radius.

Of the 9 patients observed, 3 were in the first decade of life, 4 were between 10 and 30 years of age, and 2 were more than 30 years old. Seven were males and 2, females. Seven of the subjects had anterior luxations (6 recent and 1 recurring), 1 had a recurring anterolateral dislocation, and 1 had a recent posterior dislocation.

In 7 with anterior luxation the dislocation was produced by a fall or other impingement on the upper internal surface of the forearm. This suggested a direct propulsion of the radius anteriorly. The case of lateral dislocation (Fig. 1) was probably caused by an exaggerated pronation of the forearm and a forced adduction. The mechanism in the posterior dislocation probably consisted of a violent traction stress on the forearm with pulling away of the capitulum from the lateral condyle of the humerus and interposition of a portion of the articular capsule which is particularly lax in the infant and young child. With return of the capitulum the capsule remains pinched between the two structures. This is the classic "painful pronation of the infant." Some of these elbows present a characteristic posture of the arm and characteristic palpatory findings; however, the diagnosis is easiest and most exactly made by means of the roentgenologic examination.

Of the 9 patients observed, 5 were treated by closed manipulation and 2 by surgical intervention; 2 remained untreated. The anterior dislocations were reduced under ether or thiobarbiturate anesthesia. The forearm was extended and traction applied by hand with countertraction at the shoulder. The capitulum was then pushed and manipulated into its normal place with the fingers of the operator. The forearm was then flexed to 120 degrees and put in a cast. After 20 to 25 days the cast was removed and light physiotherapy was started. The reduction was permanent in all 5 patients so treated.

In the lateral luxation reduction was obtained by traction on the flexed forearm, with pressure on the capitulum from without toward the midline. During this pressure the forearm was gradually extended, and finally immobilized in semiextension.

In the posterior luxation the head of the radius was reduced and the forearm then immobilized in complete extension. The laxity of the tricipital muscle in this position of extension favored the retention of the reduction. In this patient the reduction remained stabile and resulted in return of almost complete function of the elbow.

The 2 surgical interventions on the remaining anterior luxations were done for conditions which could not be reduced manually. In the recent dislocation there were interposed capsule and ligaments, and in the recurrent case the reduction was hindered by adhesions. In the recent case the capitulum was replaced at open operation, with fixation in place by a metallic loop passed through a drill hole in the ulna (Delitala); in the recurring condition the head of the radius was excised. The reduction remained stabile and the function of the elbow was subsequently good. Function in the other case was satisfactory.

—*John W. Brennan, M.D.*

Orthopedic Treatment of Fresh Fractures of the Spine in the Dorsolumbar Region (Traitement orthopédique des fractures dorso-lombaires récentes du rachis). ANIS MAKHLOUF. *Mém. Acad. chir.*, Par., 1954, 80: 383.

A MODIFICATION of Böhlers technique for the orthopedic treatment of fractures of the spine is presented.

Makhlouf uses a mechanized bed on which it is possible to increase gradually the lordosis of the patient, by means of a crank, in 24 to 48 hours. After a few days the patient is transferred to an orthopedic table and further reduction is accomplished under local anesthesia, and checked by x-rays. A plaster cast is then applied, and left in place for 2 to 3 months. During this time, daily exercises by the patient are carried out.

In 6 of the 10 patients treated by this method, excellent results were obtained. In the 4 remaining cases the results were good. Roentgen films showed that perfect reduction was obtained in all these fresh fractures of the spine. Two other patients with paraplegia were similarly treated soon after the accident and made good recoveries.

Sicard has his own method of treatment for these fractures, which is described. He believes that the manner in which the reduction is obtained is not so important as the quality of the reduction itself. Plaster immobilization is necessary, but the most important point is muscle re-education.

In Guillet's observation of 4,000 cases, the patients treated by Böhler's method had a much shorter recovery period. The results of spinal fusion were not as good. Guillet wonders whether better results are not obtained in fractures which remain unrecognized, because they are not treated. Sicard, however, feels that the deformed vertebra may be the cause of increased degenerative changes later in life. A good reduction is impossible after 8 days; therefore, reduction should be accomplished as soon as possible. For paraplegic patients, an early laminectomy is a poor procedure.

In the discussion of this paper, LANCE states that plaster immobilization is not the best treatment. He supports his views by the observation of MAGNUS, viz., that many more miners could resume their former work without immobilization, but with exercises for 3 months (20 per cent with Böhler's method as against 63 per cent with the "functional" treatment).

SAUVÉ is of the opinion that difficulties may not arise immediately, but may appear later in life if there is not good reduction and immobilization.

SICARD closes the discussion by claiming that a good result may be obtained if no treatment except exercises is instituted, but that this result will not endure after the patient's activity and muscular strength diminishes. Pain may arise especially in the lumbosacral area because of imbalance of the spine.

—*Joseph C. Mulier, M.D.*

Damage to Cartilage Following Antibiotic Treatment of Infections of the Knee Joint (Knorpelschaeden nach antibiotischer Behandlung von Kniegelenksinfektionen). J. RIESS. *Zschr. Orthop.*, 1954, 84: 445.

THE author reports 4 cases in which apparently adequate doses of penicillin, or penicillin and streptomycin, seemed to sterilize the joint, yet did not prevent subsequent damage to the articular cartilage.

The first case was that of a 44 year old agricultural worker who suffered a pick-ax wound of the knee with subsequent infection (septic arthritis) of the knee joint itself. Two million units of penicillin were injected intra-articularly, and in 3 days' time the symptoms were reduced; nevertheless, puncture of the knee joint disclosed penicillin-sensitive and streptomycin-resistant hemolytic streptococci. The roentgenogram disclosed erosions on the cartilage of the medial condyle of the femur. Eventually, the infection subsided but a considerable stiffness of the joint remains.

The second patient was a 20 year old woman who, in a ski accident, suffered a laceration of the internal lateral ligament of the knee joint, which was repaired with sutures. Despite prophylactic doses of 50,000 units of penicillin intra-articularly and intramuscularly for 7 days, the joint became infected. Apathogenic bacteria were found on puncture. The injections were continued and the infection eventually diminished; however, on the thirteenth day after the operation, the roentgenogram disclosed typical erosions of the cartilage on the medial femoral condyle. Six months later the knee still showed considerable stiffness; however, there is expectation in this case, of overcoming much of this residual stiffness, in view of the youth of the patient.

The third patient was a 54 year old woman who had suffered a comminuted fracture of the knee cap. The fragments were removed 16 days after the accident. On the fourth postoperative day the temperature rose to 38 degrees C. without any evidence of reaction on the part of the knee joint. Under penicillin therapy the puncture fluid was always sterile, yet the elevation of temperature, of septic character, continued, and the roentgenogram after a few days again showed typical erosions in the cartilage of the medial condyle, together with a typical narrowing of the articular cleft, and atrophic changes in the adjoining bone structure. This joint finally (after 60 days) became ankylosed in the extended position.

The fourth patient was a 30 year old policeman who was operated upon for an injury of the meniscus. Here, despite both intra-articular and intramusular injections of penicillin and streptomycin in what would seem to be adequate dosages, the knee became stiff and 7 weeks later an arthrolysis was done. Moderately extensive adhesions between the tibia and femur were separated, yet the knee could not be flexed. Further examination during the operation showed that the flexion movement was prevented by extensive adhesions in the region of the anterior attachments of the cruciate ligaments. These adhesions were loosened and flexion could then be passively accomplished. There was present a sharply delimited defect of the cartilage on the inner margin of the medial femoral condyle; bone atrophy was present. This patient is still under treatment.

The author believes that the number of strains of bacteria which are developing a resistance to the antibiotics are increasing, and he suggests that these unfortunate results may be avoided by the administration of larger doses of the antibiotics or by the finding of more powerful antibiotic drugs.

—*John W. Brennan, M.D.*

The Treatment of Fracture of the Tibial "Plateau" (Sul trattamento delle fratture del "plateau" tibiale). CARLO GRUGNI. *Rass. internaz. clin. ter.*, 1954, 34: 177.

THIRTY-ONE fractures of the tibial plateau are presented in tabular form; several are documented by appended roentgenograms. All of these patients were fairly young (the oldest was 63), and all were treated exclusively by orthopedic methods, i.e., in no instance was an arthrotomy done; optimal results were obtained in 10 instances, good results in 15, and indifferent results in 4.

Thus, from the results obtained by the author, and from his evaluation of the literature on the subject, he is reluctant to resort to surgery and does so only in the presence of ligamentous or osseous interposition, and in instances of definite diagnosis of a meniscal lesion.

Modern improvements in orthopedic treatment, such as transskeletal traction, the use of osseous pressure tongs, repeated roentgenologic control, manipulations under the fluoroscope, etc., have brought about better correction of displacements and—most

important—better restoration of knee function than formerly.

Thus, in fractures of the tibial plateau without displacement of the fragment (or fragments), the joint is immediately placed in a plaster cast and passive and active exercises are initiated after 2 days. These exercises are carried out with the patient in bed and are begun as a half hour of passive manipulations on the first day, followed by active exercises on the second day. After a week the exercise period is progressively lengthened to 2 hours. Weight bearing is begun only after about 2 weeks.

In the presence of displacement, where reposition is impossible because of edema and hemarthrosis, skeletal traction (transcalcaneal and on the double-sloped supporting splint) is resorted to. Where immediate reposition is possible, it is accomplished under the fluoroscopic screen, basal anesthesia, and with continuous traction by manual methods. In muscular individuals, or in the presence of grave displacements, recourse is always had to the intravenous use of pentothal; curare is rarely used.

Roentgenographic control and repeated successive attempts at reduction are usually followed by good anatomic and functional results. After reposition, the extremity is always placed in a full circular cast—not the usual troughlike plaster splint. The full cast prevents redislocation and exerts a constant pressure on the fragment.

Some authors believe it prudent in these instances to fix the fragment with a metallic screw, introduced through a lateral incision, but without arthrotomy. The author does not believe this extra provision is necessary when the reduction has been accomplished and consolidation is good; here he believes that the fragment will be able to resist the normal weight of the body.

Where arthrotomy becomes unavoidable, the author does little more than to fasten back, through a U incision, an avulsed tibial tuberosity, or repair a cruciate ligament through the parapatellar incision of Kocher. The Kocher incision permits of a discrete exploration of the joint without interference with the lateral ligaments or involvement of the saphenous nerve.

Osseous synthesis is resorted to only in instances of the so-called "step deformity" and here the fragment is usually fixed with a screw.

In the most severe deformities, the immobilization may be prolonged for as long as 3 months; otherwise it is discontinued after 6 weeks, and walking in a valved knee cast is authorized after 2 months.

—John W. Brennan, M.D.

Fractures of the Tibial Shaft. (Considérations sur les fractures de la diaphyse tibiale). M. VAN DER GHINST and G. PRIMO. *Acta orthop. belg.*, 1953, 19: 383.

THE authors discuss the methods used and the results obtained in a series of 57 cases of fractures of the tibial shaft. The essential feature of the discussion is the advocacy of preserved bone used as an onlay graft in suitable cases.

Of 15 patients with transverse and short oblique fractures, 9 were treated by reduction under traction, rest in bed with foot to thigh plaster casts for 6 to 8 weeks, and walking plaster casts for 4 to 8 weeks. In 5 cases without displacement consolidation was complete in 4, 2½, 3½, 2, and 4 months; in 4 cases with displacement consolidation required 3½, 3, 7, and 4½ months.

Six similar cases were treated surgically, 5 with grafts of preserved bone and one with wire and screw. A long plaster cast was applied after operation and maintained for 6 to 8 weeks; a walking cast for 4 to 8 weeks. Consolidation was complete in 3, 4, 4, 7, and 12 months; in the sixth case (wire and screw), in 5½ months. The long delayed healing in 2 cases was attributed to poor technique and incomplete fixation of the graft.

Of 21 cases of spiral and long oblique fractures, 5 were treated by reduction with traction, and plaster. Traction was sometimes maintained for 2 or 3 weeks. A walking plaster cast was applied after 6 to 8 weeks. In 3 cases with slight displacement consolidation took place in 3½, 3½, and 4½ months. In 2 cases with considerable displacement consolidation required 6 months. Of 16 cases with open reduction, 10 were treated by simple cerclage; in 9 cases consolidation took place in 1½ to 4 months (average 3 months); in 1 case consolidation required 12 months. In 3 cases cerclage was combined with use of a screw; consolidation took place in 2½, 2½, and 3 months. In 1 case a screw alone was used, with consolidation in 12 months. In 1 case an intramedullary nail was used, with consolidation in 21 months. In 1 case a graft of preserved bone was used, with cerclage; consolidation required 3 months.

The causes of failure (long delay in healing) have been too early walking (in 1 case) and postoperative necrosis of the superficial tissues with exposure of the tibia (in 2 cases).

In 14 of 19 cases of open fracture surgical treatment was carried out, usually after an interval of 2 or 3 weeks with extrusion. In 6 cases the synthesis was with wires; consolidation required 4½, 7, 6½, 5, 18, and 9 months (the fifth case required further surgical treatment—a fibular graft, transtibial Steinmann nails with a Key-Charnley frame and eventually an onlay graft of preserved bone). In 6 cases of transverse fracture a graft of preserved bone was used 3 times; consolidation required 4½, 8½, and 12 months. In 1 case insertion of an intramedullary nail was followed by consolidation in 12 months (osteitis necessitated bone curettage). In 2 cases malposition with overriding of fragments and marked shortening necessitated open operation with the use of a sliding graft; consolidation required 4½ and 11 months (8 months after the graft). In 2 cases failure to secure healing with a Key-Charnley apparatus was eventually followed by use of a preserved graft; in the first case recurrence of an infection caused extrusion of the graft; in the second case a graft was successfully applied at the tenth month and consolidation was complete 4½ months later.

The authors conclude that the use of an onlay graft of preserved bone, when it is applied with careful technique in a field that is free from infection, has definite indications and advantages in the treatment of fractures of the tibial shaft.

—Sumner L. Koch, M.D.

ORTHOPEDICS IN GENERAL

The Influence of the Blood Supply in Controlling Bone Growth. JOSEPH TRUETA. *Bull. Hosp. Joint Dis.*, N. Y., 1953, 14: 147.

THE inequality in the length of limbs, and in particular the lower limbs, has been a subject of considerable interest to the medical profession, and to orthopedic surgeons in particular for many years. Methods have been described to correct the disparity of the lower extremities by either lengthening of shorter bones or shortening the longer.

In this article, the author submits a concept of the method by which lengthening takes place in some pathologic conditions, and describes a method of altering some of the factors involved so as to cause overstimulation of growth in the long bones.

In the study of over 100 children with acute hematogenous osteomyelitis, it was noted that a substantial number of patients soon exhibited a disparity in the rate of growth in that the bone affected by the osteomyelitis was overgrowing the normal symmetric bone, sometimes in a degree exceeding 5 per cent. In analyzing these histories the author found, without exception, that in no case in which the osteomyelitis focus had been located in the epiphysis, or very close to the epiphyseal plate, did overgrowth take place. On the contrary, in a few cases in which this uncommon localization had been present the result was a decrease in the rate of growth of the affected epiphysis.

Two factors were common in all the cases showing important overgrowth: first, the lesion had been, from the beginning, mainly located in the diaphysis. Second, the lesion had always been of a serious nature and very extensive, occupying sometimes the whole of the shaft. It was found that the increase in growth persisted for some time, perhaps for a year and a half, and that in general after this period of time the disparity in the rate of growth ceased. The inequality, nevertheless, tended to remain constant. By checking at regular intervals it was found that as the disease became quiescent a bone marrow cavity opened by a process which was named "medullization" by Louis Ollier in 1867. When medullization began to appear the rate of overgrowth began to decline, and when the bone marrow was totally reopened the rate of growth became equal to that which was present in the normal leg.

From the meticulous analysis of a large series of cases it seemed evident that a direct relationship existed between the overgrowth of the bone and the occlusion of the marrow. The hypothesis was then advanced that the nutrient artery supplying 70 per cent or 80 per cent of the total intraosseous blood had been interrupted and the ischemia of the marrow was causing a hyperemia of the metaphysis. If the metaphyseal vessels (which are potentially small nutrient arteries near the epiphyseal plate) increase their blood flow, the consequence may be that the epiphyseal plate becomes better supplied with blood in its productive or metaphyseal side.

It was considered that if this theory were true overgrowth should not be confined to those occlusions of the marrow cavity due to an inflammatory process, but should also be present in cases of fracture of the diaphysis of long bones with occlusion of the bone marrow space by callus. It is commonly known that immediate shortening of bones following unreduced fracture in children, particularly in the femur, show a spontaneous tendency to correction. This tendency to natural improvement in bone length has been repeatedly attributed to a certain compensatory effort of nature, of which we know nothing.

Referring to a series of cases published by Burdick and Siris, in all cases of fracture with overlengthening, the fracture was localized at the diaphysis, and in no case did fractures of the epiphysis or metaphysis show overgrowth.

Vernon David, in making a checkup of 71 cases of fractured femur in children, found that at the end of 2 years the fractured legs became practically as long as their mates. The author believes that this could not be due to direct stimulation of the epiphyseal plate, for these fractures were not near the epiphyseal line. David also thought that the overgrowth must be compensatory and a response to the law of compensation for the restoration of the impaired function, a law which has never been demonstrated.

In evaluating the factors which were responsible for overgrowth in cases of unreduced fracture, the author found that obstruction of the bone marrow and, perhaps, stripping of the periosteum such as he had detected before in osteomyelitis, were the common factors. It seemed possible that the nutrient artery blood flow had reversed the direction of the circulation, changing it from the metaphysis towards the shaft and consequently producing an overactivity of the epiphyseal plates.

In experimental work on rabbits, the authors obstructed the nutrient artery without blocking the marrow cavity of the bone. No alteration in the growth was noted, and this confirms the findings of Wu and Milner. This procedure does not cause persistent ischemia of the shaft, since new blood vessels are formed very soon. Ferguson also failed to cause overgrowth by curettage of the bone marrow, and Ollier had the same negative results with ligation of the nutrient artery. The author then used other methods. He attempted to occlude the nutrient foramina with surgical wax or small foreign bodies which were impacted into the foramina. In another series of 20 rabbits, he buried metallic inert substances, such as duralumin and vitallium, in the center of the shaft, and in another group of animals he ruptured the nutrient artery, placing a bone peg in the marrow and raising the periosteum around it to cause the formation of an involucrum covering the nutrient foramina, in order to prevent new vessels from penetrating the bone marrow cavity. Injection of the vessels of the legs of these animals showed the difference in the vascular pattern of the control and the effect of the operation upon bone.

The author is convinced that by the prolonged interruption of the nutrient and periosteal circulation of the shaft he is able to increase the growth of long bones. A procedure to accelerate the growth of the shortened limbs in children by occlusion of the marrow space is in progress at the present time.

—Daniel H. Levinthal, M.D.

Rate of Bone Salt Formation in a Healing Fracture Determined in Rats by Means of Radiocalcium. GÖRAN C. H. BAUER. *Acta orthop. scand.*, 1954, 23: 169.

THE author has studied the rate of formation of bone salt in the fractured femur and compared it to the rate in the nonfractured femur and tibia. The experiments were carried out on rats, divided into three groups.

In the first series, each rat was subjected to a fracture of the right femoral shaft. One week later each rat was injected with a solution of calcium lactate containing 10 mgm. of Ca^{45}. The rats were then killed at intervals ranging from 1 day to 32 days after administration of the radiocalcium. Samples of bone were then taken from both the right and left femoral metaphyseal ends, the right and left femoral shafts, the right and left tibial metaphyseal ends and shafts, and from the incisor teeth. The radioactivity of the ash was then determined.

In the second series, alternatively, the right or the left femur was fractured in each animal. One week after the fractures, the rats received Ca^{45} by means of a subcutaneous injection of calcium gluconate containing 20 mgm. of calcium. The rats were then killed at intervals ranging from 1 hour to 120 hours, the blood was collected, and serum calcium determinations and radioactivity measurements were made. The tibias and femurs were treated in the same way as were those in the first series of animals.

In the third series, alternately, the right or the left femoral shaft was fractured in each animal. Two to 12 days later the animals received Ca^{45} by means of subcutaneous injection of calcium gluconate containing 10 mgm. of calcium. The same types of measurements were made on these as on the preceding groups. From the data collected, it was shown that the rate of bone salt formation in a 7-day-old callus in the femur of a rat was the equivalent of 0.04 mgm. of calcium per hour. The newly formed bone salt of the fracture callus remains at least 4 to 5 days until it is reached by the resorption process. The bone salt of the metaphyseal ends of the fractured femur is resorbed at a faster rate than is the bone salt of the corresponding ends of the intact femur. The tibia on the fractured side also shows a distinct difference in rate of bone salt formation and resorption as compared to that on the normal side.

—Edgar L. Ralston, M.D.

Long Term Redistribution of Bone Sodium Studied in Rats by Means of Na^{22} Radioautography. GÖRAN C. H. BAUER. *Acta orthop. scand.*, 1954, 23: 192.

SODIUM in bone is present in two fractions: (1) a fraction that can be accounted for on the basis of extracellular water present in the bone, and (2) the fraction that cannot be accounted for on this basis, a so-called excess sodium. Six-week-old rats were used experimentally. Each was injected with 90 μC of Na^{22}. The rats were then killed at varying intervals after the injection, and from each animal samples of serum, femora, tibias, humerus and incisor teeth were studied.

In the present series of experiments, each humerus was exposed to a photographic plate. The rats grew during the experiment, and progressive changes are shown in the radioautograms. Immediately after the administration of the radiosodium, the specific activity of the serum sodium was high. This value decreased to a 16-day value of less than one-tenth of the 1-day value. On the twenty-fifth day, practically no radioactive sodium was left in the serum. During this 25-day period, a considerable part of the stable bone sodium had been deposited from the serum. A long time after administration of the radioactive sodium, the sodium-specific activity of bone was therefore higher than that of the serum.

Radiographic study shows not only the deposition of the sodium, but the resorption as well. In the bone shaft, the interval of time between the formation and resorption of the bone tissue is longer than is the interval in the metaphyseal part of the bone. There is also a difference between the two metaphyses of the bone because the rate of bone growth is higher in the proximal than in the distal metaphysis of the humerus. A rather rapid loss of sodium is shown in the proximal metaphysis, whereas that of the distal metaphysis is resorbed at a much slower rate. The studies also suggest that sodium is actually a part of the bone salt crystal rather than being simply deposited on the surface of these crystals. *—Edgar L. Ralston, M.D.*

An Opinion Concerning Callus Formation, with Additional Experimental Studies (Eine Stellungnahme zum Callusproblem mit ergaenzenden experimentellen Studien). WILHELM SCHINK. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 173.

THE fate of bone transplanted into tissues other than bone is evaluated. The author is yet undecided whether the established opinion of osteogenesis can be replaced by the theory of metaplasia.

In the first series of experiments bone was transplanted into the great omentum of grown dogs or guinea pigs with and without ligature of the blood vessels. Autogenous bone grafts grew readily within the great omentum. The epithelial cells covering the surface of the great omentum formed a germinative tissue from which capillaries originated which penetrated the outer and inner coverings of the bone graft. Capillaries also originated from the periosteum and endosteum, forming a mass with the germinative tissue from which callus formed readily. In cases in which the blood supply was interrupted no osteogenesis was found. Lymphatic circulation alone is not sufficient to sustain the bone implant. Osteogenesis is possible only within the germinative mesenchymal tissue.

The second series included bone transplants into the great omentum with and without x-ray irradiation. The cells within the bone transplant were destroyed by the x-rays. The mineral salts developed secondary radiation which ceased after a short period of time without causing any damage to the germinative tissue. X-rays cause degeneration of the chromatin of the cells, nucleus, protoplasm, and cell membrane. Bone tissue is less sensitive to x-rays than any other tissue except ganglion cells which appear to be the least sensitive to x-ray irradiation (Holthusen).

Bony tumors and intercellular substances are apparently not affected by radiation with a dose 100

times stronger than that which causes cessation of growth. The K factor (Oberdalhoff) which is an extracellular, alcohol soluble, chemical substance capable of stimulating mesenchymal tissue and causing osteogenesis, should not be affected by x-ray radiation. It is to be concluded that the callus formation found around devitalized bone transplants originates from the surrounding tissues. The longer the transplant is kept outside the body the more vitality is lost by the soft tissue surrounding the bone transplant and the less callus is produced.

The third series comprised transplants of bone fragments surrounded by collodion. The film of collodion is not permeable to cells and larger protein molecules, but it should be permeable to the theoretical K factor. Differentiation of the outer germinative tissue into osteoid tissue was found. At the same time endosteal osteogenesis took place within the collodion membrane. This experiment may point to the existence of an osteogenetic substance (K factor).

In the fourth series bone was transplanted into muscles after being heated to 78 degrees C. for 15 minutes. In cases in which the bone transplant was heated and submerged in a physiological salt solution certain osteogenic processes were observed in the host tissues (extensive calcification). If the transplant was heated in a dry state no evidence of osteogenesis was observed.

In the fifth series a 40 per cent alcohol solution was injected into the muscles of guinea pigs and in 3 cases the formation of bone was observed within the muscles. —*George I. Reiss, M.D.*

Intra-Articular Bone Graft Resorption in Transarticular Bone Graft Arthrodesis; Experimental Studies. HEINZ GELBKE. *Arch. Surg.*, 1954, 68: 633.

IT has been widely observed that the transarticular bone graft to achieve arthrodesis has often been unsuccessful and that the portion of graft within the joint space is often seen to disappear. Whether this phenomenon was the result of inadequate immobilization and subsequent fracture of the bone graft, or whether the chemical nature of the synovial fluid was responsible for dissolution of the graft is studied by the author.

Adult dogs were used in a series of well controlled experiments. The author concludes that the synovial fluid, acting alone in the absence of joint motion, has no influence on the bone graft, but in experiments with real joint movements the mechanical forces made the bone graft give way. Excellent photomicrographs and roentgenograms are published to support this thesis. —*Norman J. Rosenberg, M.D.*

The Treatment of Postanterior Poliomyelitic Flail Joint in the Foot. (Text in Japanese; Summary in English). YASUJI ARIHARA. *Arch. jap. chir.*, 1953, 22: 415.

NINETEEN patients with drop foot as a sequela of anterior poliomyelitis were operated on since 1951. In all some sort of arthrodesis was done. Double joint arthrodesis, that is, fusion operations, were performed on the talocalcaneal and Chopart's (talonavicular) joints in 6 instances. Triple joint arthrodeses, that is, fusion operations, were performed on the 2 mentioned joints and on the talocrural joint in 11 instances. Finally, quadruple joint arthrodeses, that is, fusion operations, were performed on the 3 joints just mentioned and the navicular cuneiform joint in 2 instances. The majority of the patients were more than 8 years of age; the youngest was 5 years old. All were suffering from an extensive paralytic process of the foot. Frequently the foot condition was complicated by absence of complete functional integrity of the knee joint, that is, the effective strength of the joint in a number of instances was greatly reduced or entirely lost. In 9 instances there was a deformity in the form of equinovalgus, in 5 instances an equinovarus, and in 2 instances a simple pes equinus.

Since experimental and clinical experience has cast doubt on the value of the usual orthopedic braces and of operation on the muscles and tendons (which are so often shown by biopsy and histological study to be much further advanced in degenerative regression than their clinical appearance and findings would seem to indicate), and since the experience gained from the author's work has been so little, he refrains from making sweeping conclusions regarding these methods and restricts his attention chiefly to the operation of triple joint arthrodesis.

It is with this operation, a modification of the Lorthior operation by Jinnaka, that he has procured the most satisfying results with regard to a gain in stability of the foot without repercussions on the functioning of the knee joint. In no instance in which this operation was performed has there remained, after a year's time, any residual edema of the foot or any complaint of pain. It must be emphasized that this matter of pain, following operation on an essentially painless disability such as anterior poliomyelitis, is of paramount importance. A residuum of painful function following the operation in these patients would indeed represent a serious misfortune.

When triple joint arthrodesis tended to leave a residual drop of the foot anterior to the talocalcaneal joint, the necessity of considering an arthrodesis of the navicular cuneiform joint also arose, and in 2 instances an arthrodesis was done. However, there are rather serious objections to the quadruple joint arthrodesis and, since such expedients as muscle transplantation and tendon fixation have proved rather ineffective in the author's experience, there is now being considered the possibility of a triple joint arthrodesis combined with Campbell's joint block operation (Campbell, Willis: *J. Am. M. Ass.*, 1927, 85: 1925) on the calcaneotalocrural mechanism of the ankle joint.

In the meantime, in the instances in which the triple joint arthrodesis has proved sufficient (11 instances), the results in the majority of cases which could be followed-up have indeed been gratifying. Patients, who previously could walk or stand only with the aid of the hand supporting the thigh or the knee, are now able to walk about and follow their ordinary avocations without any support whatever. They form an appreciative and happy nucleus for this series of sufferers. In the beginning the foot was immobilized following the arthrodesis operation at approximately a right angle, and in the instances in

which the shortening was not too great an elevated boot was prescribed; however, when there had been a shortening of more than 3 cm. it seemed advisable to put the foot up in a posture of pes equinus, the posture then tending to make up for the shortening of the limb as a whole.

As a rule, 2 months following the operation the foot was found, clinically, to have lost its mobility, and after 3 to 4 months bony consolidation had developed. Roentgenologically, after 2 months there was evidence of eburnation in the ankle bones; however, after 6 to 8 months this deep shadowing had disappeared and the bone trabeculae were observable, passing from bone to bone. In no instance was there roentgenological evidence of either necrosis or pressure erosion. Roentgenologically, osseous fusion was found completed first in the talocalcaneal joint and then in the talocrural and talonavicular joints, in the order named. In the talonavicular joint there was a tendency to recurrence of bone dehiscence with the formation of pseudarthrosis following slight trauma, and this necessitated the extending of the period of immobilization in a cast longer than would have been necessary otherwise. —*John W. Brennan, M.D.*

An Experimental Study of the Early Healing of Tendons. TORD SKOOG and BENGT H. PERSSON. *Plastic & Reconstr. Surg.*, 1954, 13: 384.

THE authors attempt to study the roll of endotenon, peritenon, and paratenon in the process of tendon healing. They have used the Achilles tendon in rabbits, and in one group a series of animals had simple division of the tendon without suture, division of the tendon after scraping off of the peritenon, and the same two procedures with the exception that the cut ends of the tendon were enclosed in stainless steel foil. A second group, essentially the same as the above, was studied with the exception that the tendons were sutured. A third group was studied in which the tendon was divided at two points about 12 mm. apart, completely freed, replaced, and sutured. They define endotenon as a connective tissue between bundles of a tendon; peritenon, the connective tissue covering the surface of a tendon; and paratenon, the connective tissue outside the peritenon and not belonging to the tendon structure proper.

The results of experiments are very well presented by virtue of excellent photomicrographs which seem to illustrate that the endotenon played no part in regeneration; that the peritenon alone was inadequate to permit healing within a normal period; and that the paratenon was the main source of a new connective tissue which arose. The earliest appearance of undifferentiated connective tissue originated from the paratenon and in the second week could be seen growing into the cut end through the tendon. When the peritenon had been scraped off there was a great increase in the surrounding connective tissue which tended to invade the tendon itself at this point, leading to marked adhesions between the tendon and surrounding tissues. The viability of tendon grafts was found to depend upon the surrounding paratenon. If the peritenon of the graft was removed at operation an increased amount of connective tissue was laid down by the paratenon. Isolation of the lesion from surrounding tissues by means of a thin tube of stainless steel foil led to delay in healing.

—*Norman J. Rosenberg, M.D.*

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Experimental Study of Temporary Restoration of Cerebral Return Circulation Following Resection of Both Jugular Systems by Means of a Polythene Tube (Étude expérimentale du rétablissement temporaire par tube de polythène de la circulation de retour céphalique après resection des deux systèmes jugulaires). J. P. Witz and H. R. Kahle. *J. chir.*, Par., 1954, 70: 241.

Following a review of the literature concerning the dangers of bilateral ligation of the jugular veins, and bilateral resection of these veins, it is emphasized that authorities do not agree concerning the respective importance of the results of suppression of the cerebral return circulation, and as to the degree and significance of hypertension of the cerebrospinal fluid. As regards the relation between venous pressure and pressure of the cerebrospinal fluid, it is generally agreed that the latter reflects the former. It has been demonstrated that the cerebrospinal fluid pressure rises rapidly following ligation of one jugular vein, and that it rises still more following ligation of the second jugular vein, in one or two stages. This increase has been attributed to venous distention rather than to an increase in cerebrospinal fluid, since the phenomenon develops so rapidly.

From a study of the reports of these experiments and operations, the authors have come to the conclusion that in order to avoid the immediate complications following sudden suppression of both jugular veins, it would be necessary to establish a temporary path of venous return. Plastic tubes have been used in arterial surgery, but to the authors' knowledge they have not hitherto been used to restore the continuity of a vein. For this reason preliminary studies on dogs were made.

In both series of 6 dogs, the external and internal jugular veins were resected, likewise a large pretracheal vein having several anastomoses with the internal jugular vein. In one group, a polythene tube of proper dimensions was inserted between the proximal and distal ends of the resected external jugular vein on one side. Venous pressure was recorded before the operation, after unilateral and bilateral resection, and before and after inserting the polythene tube. For the purpose of comparing the results of this method with those of venous grafts, the authors performed the same operation on 2 large dogs, replacing the external jugular vein on one side by a segment taken from the first side.

A diffuse oozing of dark blood following venous grafts became almost negligible after introduction of the polythene tube. Venous pressure in the proximal end of the external jugular vein was greatly, though irregularly, increased, whereas, following introduction of polythene tubes, the venous pressure above the tube was low. Of the 6 dogs in the control series, 1 died during operation of air embolism and 3 died 3, 4, and 16 days after operation. Of the 6 intubated dogs, only 1 dog died, one week after the operation; this animal had been subjected to anesthesia three times in 1 week. The operative results, including cicatrization, time of return to preoperative state, and behavior of the animals, were much better in the animals with intubation.

The necessity for a permanent route of return for the cerebral circulation following resection of both jugular veins is far from having been proved. Moreover, the procurement of a venous graft and its introduction greatly prolongs an operation that is very long to begin with. Finally, it is very unlikely that a venous graft situated under a thick cutaneous flap in the midst of a more or less infected, oozing area will retain its permeability for any considerable length of time.

The first of the 2 dogs in which the venous graft was attempted died of anaerobic septicemia 6 days after the operation, and the second dog developed considerable edema of the neck on the fourth postoperative day, due to thrombosis of the graft. The further course in this animal was similar to that observed in the dogs with polythene tubes, the edema disappearing on the fourteenth day in spite of superinfection of the wound. Thus venous grafts, although apparently a more physiologic method, would seem of doubtful value for the purpose in view.

From their studies, the authors conclude that bilateral resection of the two jugular systems in animals, as in man, may give rise to serious complications that are difficult to foretell. The number and size of the collateral vessels relieve somewhat the insult of suppression of the main venous trunks following a brief period of adaptation. Temporary restoration of continuity by preventing too sudden and brutal a stasis will facilitate phenomena of adaptation. The introduction of a polythene tube between the ends of one of the resected veins permits such a shunt, with maximal advantages. —*Edith Schanche Moore.*

Hazards of Neglecting Treatment in Varicosis Accompanying Pregnancy. H. I. Biegeleisen. *Angiology*, 1954, 5: 84.

Two general types of phlebitis may complicate pregnancy: superficial and deep. Deep phlebitis may arise in the parametrial plexus of veins and spread to the large vessels of the pelvis from which it may ascend into the abdomen or descend into the iliac and femoral veins, or in the superficial veins where the thrombophlebitis may form and spread to the deep system. Varicose veins may thus become a starting point for a deep phlegmasia. Sullivan, in a study of varicose veins in pregnancy, found that 50 per cent of individuals with thrombophlebitis had preceding varicosities. Treatment of varicose veins during pregnancy is important prophylactically, as it reduces the incidence of phlebitis.

The author favors injection over operative treatment of varicosis during pregnancy, although he mentions there are other writers who do not agree.

From all the available information in the literature and the author's personal observations, it is as safe to treat varicosis during the pregnant period as at any other time. There is no increase in the occurrence of complications and the clinical picture is substantially the same for both groups. There have been no reports of any deleterious effects upon the fetus with this type of therapy, and no cases reported of early or late interruption of pregnancy as a consequence of varicose vein therapy. Treatment can be carried up to the eighth month of gestation. While there has never been a scientific case made against the treatment of varicose veins during pregnancy, nevertheless there exists today an unfounded fear and confusion concerning treatment during this period, and an overcautious attitude which, while understandable, militates against the comfort and security of the patient.

There is definite evidence pointing to the fact that varicosis bears a specific relationship to the development of superficial and deep phlebitis following delivery. Treatment of varicose veins tends to prevent this complication and one may conclude that it is safer to treat this condition than to allow it to remain.

—Albert M. Schwartz, M.D.

The Basic Study of Arterial Dilatation in Arteriovenous Aneurysm (Zur Grundlagenforschung der Arteriendilatation beim arterio-venoesen Aneurysma). FRANZ MOERL. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 277: 586.

DILATATION of the communicating vein in an arteriovenous aneurysm is easily understandable as it is due to increased internal pressure. The mechanism of the not infrequently encountered dilatation of the afferent artery, accompanied by reduction of the thickness of its wall, is not so easy to explain. The hypothesis that relaxation of the arterial wall is attributable to a local hypotension has been shown to be incorrect. To shed some light on the genesis of arterial dilatation, the author performed experiments based on the following hypothesis:

The reflex of relaxation of the arterial wall above an arteriovenous aneurysm can appear only if the peripheral area, where the reflex originates, is present. It follows that, in dogs, a dilatation of the afferent artery can take place only if the involved extremity is intact, and should be absent if creation of the aneurysm is preceded by an amputation of the leg at the height of the knee. The diameter of the artery was estimated indirectly by determination of the velocity of pulse waves.

The results of the experiments show that progressive dilatation of the afferent artery is initiated by a reflex of relaxation, originating in the peripheral area. This reflex is followed by the effect of mechanical factors which contribute to further dilatation of the artery. The author enumerates the following factors: increased volume of the circulating blood, increased pressure on the arterial wall, and increased hydrostatic pressure.

There are exceptions to the rule that the gravity of cardiac changes is in proportion to the degree of dilatation of the afferent artery.

The fact that dilatation of the afferent artery does not take place if the aneurysm is located near the heart can be attributed to the elastic structure of the arterial wall and inability of the artery to undergo active structural changes; it applies to aneurysms of the innominate, subclavian, and carotid arteries.

Many authors advocate lateral suturing of the dilated artery in arteriovenous aneurysms of long standing, because after the operation the blood supply to the periphery remains at an optimal level. However, the impairment of the heart by the dilated artery remains and there also is danger of a rupture of the suture line. If after elimination of the arteriovenous fistula the cardiac action does not improve, a secondary resection of the dilated artery comes into consideration. Determination of blood pressure after central compression of the dilated artery may serve as a criterion. If the blood pressure rises, good results may be expected from a resection of the artery. The operation should be undertaken only if arteriographic studies demonstrate a sufficient collateral circulation.

—Joseph K. Narat, M.D.

Revascularization After Ligation of the Iliac Arteries (Tentativi di rivascolarizzazione degli arti inferiori dopo legatura delle arterie iliache). G. MARCOZZI and G. MAZZONI. *Ann. ital. chir.*, 1954, 31: 18.

THE authors are interested in the study of a new collateral blood supply in extremities with insufficient arterial circulation.

Experiments were performed on 6 dogs and 4 rabbits. Sections of the iliac artery were resected on both sides in all animals. About 15 to 30 days later some sterile talc powder and sterile asbestos with sulfonamide powder was placed into one thigh near the resected arteries, the other thigh acting as a control. In some animals these substances were injected a second time with a large bore needle and normal saline solution to dilute the powders. In a second group a ganglionectomy or lumbar sympathectomy was performed in addition to the procedure described. Arteriograms were made in from 2 to 8 months.

The injected powders created an aseptic inflammatory reaction which always produced a much better collateral circulation than that on the opposite side which acted as the control. The collateral circulation was much better still in the animals which were subjected to a ganglionectomy or lumbar sympathectomy.

—Lucian J. Fronduti, M.D.

The Syndrome of Acute Ischemia of the Extremities and Arterial Reanimation; New Etiologic and Therapeutic Findings (Les syndrome d'ischémie aiguë des membres et la réanimation artérielle; nouvelles données étiologiques et thérapeutiques). A. LEMAIRE, E. HOUSSET, A. MASCHAS, J. NATALI, and F. COTTENOT. *Presse méd.*, 1954, 62: 681.

THE syndrome of acute ischemia of the extremities is characterized by a sudden onset of pain, followed by complete cessation of circulation in the involved area, which ultimately leads to gangrene. This definition is preferable to such terms as "false embolism," "embolism without an embolus" or "pseudoembolic arterial obliteration" because it abstains from any suggestions as to the pathogenesis or etiology of the condition.

The syndrome of acute ischemia of the extremities may be caused by one of three factors: (1) arterial

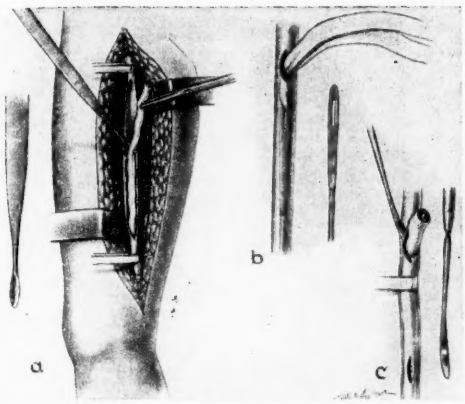

FIG. 1 (Pratt, Krahl). Intimectomy. (*a*) Removal of new and old clot and plaque; (*b*) cleansing arterial debris by ramrod method; (*c*) removal of intima and media with clot by multiple incisions; note spatulas. (Courtesy of American Journal of Surgery).

embolism, (2) thrombosis or functional disturbance, usually called "spasm," or (3) "arterial inertia."

The venoarterial reflexes were studied by means of two types of apparatus: the volumetric microplethysmograph and the photoplethysmograph. It was found that in normal individuals, irritation of a vein, be it by puncture or gentle compression, does not affect the function of adjacent arteries or arterioles, while vigorous compression produces a transient arterial spasm. In patients with a manifest vasomotor instability, demonstrable by plethysmographic records, and in patients with hypertension or artificially produced hypotension, even a moderate irritation of the veins provokes a spasm of arterioles and arteries of the digits. The spasm persists after cessation of the venous irritation. This experimental evidence lends support to the hypothesis that a fortuitous coincidence of an intensive vasomotor instability and irritation of a vein may lead to an ascending arteriospasm with resulting acute ischemia.

In a woman, aged 47, acute ischemia of the right forearm developed 5 hours after aspiration of blood from the basilic vein, for a Kahn test. The second patient, a man 43 years of age with cardiovascular collapse, developed the same condition a few hours after eight consecutive injections of plasma, neosynephrine, pronestyl, and several other stimulants, all given into the same vein.

Alarming signs in both cases were successfully combated by the following method. A long incision exposed the involved artery, and from 50 to 80 c.c. of physiologic saline solution were injected under high pressure in a cephalad direction a few centimeters below the upper end of the inert, flaccid segment of the blood vessel. The portion of the artery proximal to the site of the insertion of the needle promptly resumed its normal appearance and pulsation. The procedure was repeated by inserting the needle each time 6 or 7 cm. distal to the preceding puncture.

The authors attribute the beneficial effect of such injections exclusively to the distention of the arteries by the relatively large amounts of saline solution.

—*Joseph K. Narat, M.D.*

Surgical Therapy for the Occluded Artery. GERALD H. PRATT and ENZO KRAHL. *Am. J. Surg.*, 1954, 87: 722.

IN DESCRIBING the surgical treatment of the occluded artery, the authors consider the indirect method and the direct methods of treatment.

Under "indirect methods," sympathectomy and its results are described. Paradoxical gangrene following sympathectomy has not occurred in the authors' cases and it is their belief that such a condition might develop where a sympathectomy is done too late.

Under the "direct method" of surgical treatment of the occluded artery, two procedures are described and illustrated: first, intimectomy, or removal of the intima of the vessel, and second, the making of analogous vein grafts to short-circuit obstruction.

Postoperatively, all patients in this category should have anticoagulant therapy, which may be given in the form of heparin or injectable dicumarol until such a time as the anticoagulant effect is apparent, as shown by the elevated prothrombin time. The prothrombin time should be kept at between two or three times normal, or between 25 and 35 seconds in the concentrated tests of the Link-Shapiro modification of the Quick test. The part should be protected against injury or trauma of a mechanical and thermal nature. Ambulation should be prohibited until such time as the circulation is intact. Surgical therapy for the removal of the source of emboli should be considered. If a mitral stenotic lesion is present, some patients

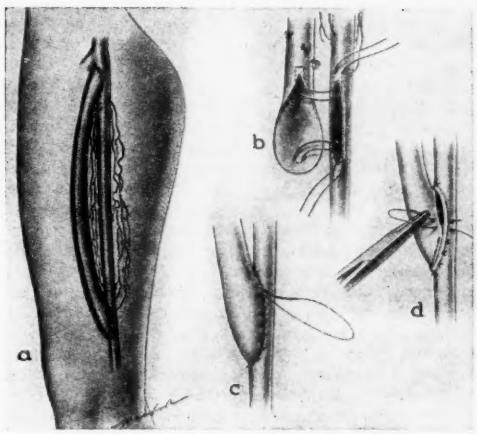

FIG. 2 (Pratt, Krahl). Analogous vein graft for arteriosclerotic lesion. (*a*) End-to-side anastomoses above and below block using saphenous vein; note collateral circulation remains intact; (*b*) technique of anastomoses; mattress suture at upper and lower ends; (*c*) continuous over-and-over anastomotic silk suture; (*d*) interrupted everting mattress sutures, used for tension or if growth of vessel is expected.

should be considered for commissurotomy and auricular appendectomy, unless other cardiac conditions, age, or disease precludes such therapy. At such time the thrombosis in the auricular appendage or auricle should be excluded by opening the appendage and permitting auricular systole to push any clot out, or by manually removing it. The use of restraining sutures around the subclavian and innominate arteries to prevent cerebral embolism during this operation has been stressed by Bailey and is worthy of repetition. Thereafter, conservative measures as outlined in acute arterial occlusion are of value. These include the use of long term anticoagulant drugs, the avoidance of all vasoconstriction of a medical, chemical, or physical nature, and use of the part below the stage of fatigue.

—*John J. Maloney, M.D.*

The Creation of Autogenous Vessel Grafts; Experimental Study. Newton Chun, Richard A. Forney, and Egbert H. Fell. *Arch. Surg.*, 1954, 68: 574.

The present experiments were undertaken in a search for methods by which tissue suitable for arterial replacement could be made available without reliance upon stored tissue or upon the coincidence of availability of suitable fresh material. Criteria for materials for arterial substitution are: strength of material, adaptability to and acceptance by the host, ready availability, safety, and reasonableness of cost. The suitability of tubes fashioned of native tissue, composed of a lining of endothelium with reinforcement of fibrous living tissue was evaluated.

Dogs were used in this investigation; the jugular veins were employed for lining, and fascia lata or fascia of the external oblique muscle was used for purposes of reinforcement. Tubes of living tissue were created at one operation and left within the animals for varying periods of time, subsequently being transplanted as free grafts to the aortas of the same animals and allowed to remain for periods from 2 to 140 days. The first portion of the experiment was designed to determine whether vein and fascia could be induced to fuse into a single flat structure, with survival of both tissues. Free vein segments were obtained and were opened longitudinally; several such rectangles of vein were then sutured together side-by-side, and the sheet of vein tissue thus constructed was laid out flat upon the exposed rectus fascia, where it was loosely affixed by sutures of fine silk; then endothelial-lined tubes were constructed primarily, using vein and fascia placed in contact, the double thickness being then rolled and sutured over tubes or rods of nonreacting plastic material. The venofascial tubes, removed from the locations in which they had been surgically assembled, were transplanted as autografts to the thoracic or abdominal aorta.

Pertinent tissue was examined and described grossly, and careful microscopic studies were made of vein-fascia preparations, both in their sites of assembly and in their sites of transplantation to the aorta. Preparations of vein affixed flat onto fascia were examined in 9 to 24 days, and in all four experiments there was visible gross union at the contact surface, which could not be separated without difficulty. Vein and fascia rolled about a smooth plastic rod provided firm tissue tubes with smooth inner surfaces which had little tendency to adhere to the stent. It was found that hollow tubes do not serve well, as serum collects within the lumen. The resultant tubes, 7 to 52 days after their construction, were found to bear a close resemblance to the original fascia on the outer aspect; necrosis was absent; sutures were covered with cellular growth and, though firm, the tubes were relatively inelastic. The tubes were sufficiently firm to handle easily and to hold sutures securely, factors of great importance in the performance of anastomoses with the thoracic aortic circulation occluded. Vascular tubes, after autografting and transplantation to the aorta in 22 dogs, were closely observed for evidence of dilatation when exposed to aortic vascular pressures; neither distention nor "ballooning" occurred.

The method described in this investigation permits the formation by surgical means of a tubular structure composed of native, host tissue, sterile and adjustable to predetermined diameter and length, and suitable for bridging major vascular defects. After its assembly in the host tissues the vein-fascia preparation becomes a firm unified structure in about 3 weeks and is then a workable tube, suitable for removal to its intended location. Use of a tubular stent within the vessel may be employed to permit immediate transplant of such a vein-fascia tube. Autogenous vein transplants made by other investigators have consistently become distended and elongated when not supported by reinforcing materials. The bed of the thoracic aorta, being an "unsupported" area (subject to intermittent negative pressures), is an ideal site for testing the ability of repair materials to resist lateral pressure. The fact that graft dilatation did not occur with preparations in this investigation is again pointed out as evidence of workability of this method.

The authors conclude that tubular structures of vein reinforced by fascia are satisfactory for use as grafts to the thoracic or abdominal aorta; that such simulated arteries can be prepared readily of autogenous tissues by methods which are safe, reliable, and relatively technically easy (to allow for fusion between vein and fascia in preparing autotransplants, a period of 3 weeks is advisable before grafting); and that tissue so transplanted functions and continues to survive as living tissue with but few attritional effects up to 140 days. There is persistence of fibrous and elastic elements in vein-fascia autografts to the aorta.

—*Albert M. Schwartz, M.D.*

The Sequelae of Grafting a Preserved Human Aorta for Stricture of the Aortic Isthmus (Les suites d'une greffe d'aorte humaine conservée pour rétrécissement de l'isthme de l'aorte). J. Ducuing, A. Enjalbert, H. Eschapasse, and G. Moreau. *Mém. Acad. chir.*, Par., 1954, 80: 406.

A segment of aorta 6 cm. in length, which was obtained from a man who succumbed to an extensive burn was grafted 8 days later to a patient with coarctation of the aorta. Silk was used as the suture material. The patient remained in good health and was able to work in a steel mill for 17 months following the operation. After a heavy physical strain he then experienced several episodes of hemoptysis which led to a fatal outcome.

The autopsy revealed 2 aneurysms at the distal suture line, with perforation of 1 aneurysm into a bronchus.

Basing their opinion on admittedly very limited experience, the authors express doubt as to the practical value of arterial grafts because in the course of time their lumen becomes obliterated or they are apt to distend and rupture. Whereas such grafts may be useful in the extremities, their value is problematic as far as coarctation of the aorta is concerned.

In a group of 60 patients with this condition the authors did not encounter 1 in whom an aortic graft was indicated, because Crafoord's method of end-to-end anastomosis, which furnishes excellent results, could be employed in 59 patients, and Clagett's anastomosis between the subclavian artery and the aorta could be done in 1 patient.

The authors no longer ligate the deep intercostal arteries in the course of Crafoord's operation but clamp them temporarily, thus augmenting the blood supply to the descending aorta after the operation. In this manner the blood pressure equilibrium between the upper and the lower extremities is more rapidly re-established. —*Joseph K. Narat, M.D.*

BLOOD; TRANSFUSION

Whole Blood Volume Determined by Radiochromium-Tagged Red Cells. Comparative Studies on Patients with Normal and Congestive Heart Failure. William A. Reilly, Richard M. French, Frances Y. K. Lau, Kenneth G. Scott, and William E. White. *Circulation*, 1954, 9: 571.

Radiochromium emits mainly a gamma radiation, and a scintillation crystal detects this very efficiently. This permits a low injection dose and small blood samples. Radiochromium is rapidly taken up by the red cell in vitro. The tag stability is relatively constant for at least 24 hours in vivo.

The advantages and method of using radiochromium are described for the determination of the whole blood volume in patients with normal and congestive heart failure. Patients with normal heart function were observed to have whole blood volumes of 65.5 ± 5.95 c.c. per kilogram or 2.49 ± 0.28 liters per square meter of body surface area. Hypervolemia occurs in the majority of cardiac patients with signs and symptoms of right ventricular failure, but not in those cardiac patients with left ventricular insufficiency or mitral stenosis alone.

Serial determinations were done on 16 patients with symptoms and signs of right and left ventricular failure. In general, the blood volumes reverted to normal values as the cardiac reserve returned. The converse was true in patients who became clinically worse or died. The increase in the whole blood volume was most marked in patients with severe edema and slight in those with pulmonary congestion alone. —*Robert A. Nabatoff, M.D.*

Effect of Storage at Room Temperature on Infectivity of Icterogenic Plasma. Roderick Murray, Frank Ratner, William C. L. Diefenbach, and Herman Geller. *J. Am. M. Ass.*, 1954, 154: 13.

Recent reports by Allen and his coworkers indicated that a lowered incidence of homologous serum hepatitis resulted from the infusion of plasma stored at room temperature. The authors investigated this means of inactivating the agent of homologous serum hepatitis by inoculation, in volunteers, of plasma that was known to be icterogenic. Fifty-five volunteers served as controls; the volume of the inoculum in each case was 1 ml. of the test plasma; the take rate was 52 per cent (in 40% of those inoculated, hepatitis with jaundice developed and in 12.7% hepatitis without jaundice developed).

Previous experience with the plasma used had shown that it was icterogenic. In the test group, hepatitis developed in only one person out of the 19 who received plasma stored at room temperature for 6 months, which suggests that the infectivity of such material must be low. In considering these results, attention should be given to (1) the dilution of the original icterogenic material (1:133) and (2) the size of the individual inoculations. The volumes used were 1 to 2 ml., whereas in the clinical administration of plasma, the volumes are of the order of 500 ml. It has also been shown that materials that have appeared innocuous when administered in small doses (1 to 3 ml.) have produced hepatitis when given in the larger doses used clinically.

—*Albert M. Schwartz, M.D.*

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Operative Risk and Means of Its Prevention (Das Operationsrisiko, Massnahmen zu seiner Vermeidung). E. Domanig. Medizinische, 1954, p. 540.

Operative risk in a large number of patients is minimal because of careful management. Asepsis, good anesthesia, and proper preoperative and postoperative treatment are some of the basic requirements.

The author specifically discusses the importance of maintaining the so-called "physiological equilibrium." Interruption of the normal life of the patient should be minimal. Early ambulation, and fluid and diet by mouth as early as possible are emphasized. Medication is limited mainly to the relief of pain and the need of sufficient sleep.

As a practical example the author discusses a series of 450 patients more than 60 years of age who underwent hernial repair. This series included patients up to 80 years of age with a predominance of free and incarcerated inguinal and femoral hernias. The mortality was 10.5 per cent.

Careful consideration must be given to a patient in a state of physiological derangement as a derangement of this sort represents a discrepancy between proper efficient function and demand. Proper function of the whole organism finally goes back to the perfect functioning of the single cell. Normally, the single cell is in a state of physiological equilibrium. Derangement can be caused by poor nutrition, toxins, and bacterial infection.

Normally, the organism supplies the daily required energy from a reservoir maintained by food. If the reservoir is exhausted, body substance has to supply the necessary energy. Carbohydrate, fat, and, finally, protein are used up more and more, resulting in an increasing discrepancy between the functional capacity and demand. Patients with cancer are very often found in this derangement, chronic toxic cell damage being an additional factor. The anamnesis, and clinical and laboratory findings reveal this condition, which must be corrected prior to surgical intervention.

In the preoperative treatment the author considers the oral route for correcting a deficiency in carbohydrates, fats, and proteins far superior to any other, such as the rectal or parenteral. A protein-rich diet, vitamins, and the necessary amount of calories are essential. With regard to the fluid and electrolyte balance, the hemoglobin and erythrocyte count are not reliable. Hemoconcentration can simulate a normal condition while chronic anemia of high degree is present. The author emphasizes that intravenous fluid administration is a substitute for oral administration, and points out the danger of circulatory impairment.

During surgery 3 important points are stressed: (1) blood loss should be minimal, (2) any blood loss over 200 to 300 c.c. should be corrected during surgery, or at least immediately afterward, and (3) fluid requirements for the day of operation should be routinely administered. Modern anesthesia has contributed much to minimize surgical trauma. The detrrmination of the blood loss is most accurately achieved by weighing the sponges.

The same basic principle applies for the postoperative period. Maintenance of the physiological equilibrium is important. The author suggests that the patient get out of bed on the day of operation, even after pneumonectomies and total gastric resections. He considers the only permissible exception to be peritonitis. Again, particular emphasis is placed upon the fluid and diet, oral feeding being much superior to intravenous administration. Postoperative pulmonary and circulatory disturbances can be reduced to the extent that one is able to maintain the "physiological equilibrium of the organism."

In the author's experiences postoperative pneumonia has been reduced to 10 per cent in his department. However, careful consideration was given to daily regular breathing exercises.—*Edith Simandl, M.D.*

Excision or Irradiation of Melanoblastoma? (Excision oder Strahlenbehandlung des Melanoblastoms?). H. Poppe and G. Fraedrich. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 50.

The authors, of the Surgical Department of the University of Goettingen, Germany, discuss the question whether surgery or irradiation is preferable for the treatment of melanoblastoma of the skin.

The statistics of survival as published in the international literature (1,079 cases) give a very gloomy picture. Only between 7 and 20 per cent of the patients survived for more than 5 years. Similarly poor results were obtained in a series of 118 patients treated at the University of Goettingen partly by surgery (including amputations of the extremities), partly by x-ray or radium irradiation, and partly by a combination of both methods. Only 34 of the 118 patients were still alive after 5 years. It is most remarkable that histologically "benign" melanomas had about the same proportion of metastases as those which were pronounced malignant by the pathologist.

These poor results caused the authors to change the method of treatment during the last 2 years. They state that the formerly applied dosage of irradiation was much too low. Melanoma requires a total dosage of at least 20,000 roentgens. In some cases the authors gave 35,000 roentgens as the total dosage. The resulting necroses of the epidermis healed in all cases within 6 to 8 weeks. The daily dosage was 500 to 1,000 roentgens. In all cases the regional lymph nodes should be irradiated at the same time with a total of 5,000 to 6,000 roentgens. Surgery, and especially biopsy, of a nevus is strictly contraindicated.

Ten patients treated by this method have been cured and are free from metastases for 27 months; 6 more have been treated too recently (up to 14 months) to permit a final evaluation.

Attempts at influencing generalized metastases with radioactive phosphorus or radioactive tyrosin have

been unsuccessful. However, the injection of radioactive tyrosin is a very valuable and completely innocuous procedure for differentiating between benign nevi and melanoblastoma. The authors tested 138 pigmented nevi by this method. In active melanoblastoma a measurable accumulation of radioactive tyrosin in the tumor could be demonstrated within 8 hours, whereas in simple nevi no tyrosin could be measured 28 to 36 hours after the injection.

—Werner M. Solmitz, M.D.

Surgical Treatment of Plantar Warts, Callosities, and Ulcers. J. THOMAS GIANNINI. *Plastic and Reconstr. Surg.*, 1954, 13: 130.

THE treatment of complicated plantar verruca, callosities, and ulcers is more difficult and more extensive than that for original verruca or callus. When recurrence follows failure of treatment of the original lesion, procedures such as cross-leg flaps, amputation of the digit under the callus, and local pedicles with skin grafting of the donor areas have been recommended.

The author has devised a method which he has used successfully in 11 cases (Fig. 1). It consists of making an incision from the medial aspect of the lesion out along the medial aspect of the adjacent digit. A flap is then elevated, the artery and nerve supply to the flap being preserved. The lesion is then excised and a subperiosteal excision of an adequate amount of the proximal phalanx of the exposed digit is performed. This permits approximation of the cut margins of the flap without tension. The divided proximal phalanx is fixed internally with a Kirschner wire for 10 days to 3 weeks. The wounds are usually healed at the end of 2 weeks. Metatarsal bars are used when weight bearing is first resumed at the end of the 2 week period. No further follow-up of these patients is presented.

—Harold M. Unger, M.D.

The Thorn Test in the Surgical Diseases of Children (Der Thorn-Test bei chirurgisch erkrankten Kindern). JOERG REHN. *Langenbecks Arch. u. Deut. Zschr. Chir.*, 1954, 278: 196.

ABSTRACTS of other studies by this author on subjects related to those here discussed have appeared in *Surg. Gyn. Obst., Internat. Abstr. Surg.*, 1952, 95: 517; 1953, 97: 509. An article by Rehn, published in *Arch. f. klin. Chir.*, Heidelberg, was abstracted in the *J. Am. M. Ass.*, 1951, 147: 786. His article on the relationship between penicillin injections and the Thorn test appeared in *Chirurg*, 1951, 22: 299. In the *J. Am. M. Ass.* abstract, the author stressed the value of the relationship between ACTH and the Thorn test in ascertaining, prior to surgical intervention, the response of the adrenal cortex to a stress similar to operative trauma. Here, however, the author was dealing with adults.

In the present article the author repeats his studies, using children as his study material. The children examined were from 15 months to 14 years of age. The dosage of ACTH was 10 units in children between the age of 15 months and 7 years, 15 units in children between 5 and 11 years, and 20 units in children between 11 and 14 years of age. The size of the dosage overlapped for certain age groups, since the condition of development of the child was also considered. Higher dosages did not affect the results.

FIG. 1 (Giannini). The operation, *1*, the ulcer; *2*, the incision; *3*, the elevation of the pedicle; *4*, splinting the digit; *5*, the closure; and *6*, the web closure.

In general it was found that in children the spontaneous change in the eosinophile count was greater than in the adult, and exogenic stimuli showed that these children were far more sensitive as regards the eosinophilic response than the adult. This fact, of course, limits the value of the ACTH-Thorn test in children. Thus, for the important determination as to the application of cortisone or ACTH in the treatment of children with severe injuries (burns), the Thorn test, on the whole, is not practicable since the interval between the injection and the eosinophile count is too long, and besides the eosinophile count is already so low by the time the test can be applied that its use would be superfluous.

The author concludes that the general application of the Thorn test in children's surgery is to be rejected.

—John W. Brennan, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Contribution to the Experimental Pathology of Cutaneous Burns (Contribution a la pathologie expérimentale des brulures cutanées). A. MONSAINGEON and L. ORCEL. *Lyon chir.*, 1954, 49: 269.

THIRTY rabbits were used to study the modus operandi of the behavior of fluorescein in experimental burns. These burns were produced on the inner, or nonhairy, surface of the rabbit's ear, and the behavior of fluorescein in relation to the area of burn was observed through the intermediation of Wood's light. The pur-

pose of this study was not to observe if the fluorescein could indicate by its nonpenetration into the burned areas the absence of circulation of the blood, that is, tissue death, but rather to attempt to elucidate the reasons for its failing to do so, as the fact that fluorescein does not indicate the areas which are doomed to ultimate necrosis in burned areas is well known.

It was found that in the early period following the burn the fluorescein does not penetrate into the burned area. Nevertheless, the temperature within the area of the burn frequently assumed a course which was markedly higher than that of the surrounding nonburned areas. Yet this behavior of the tissue temperature was not more efficient than failure of penetration of the fluorescein, its tendency to become abnormally accumulated around the edges of the burned area, and its ultimate penetration and retardance of elimination in indicating the tissues of the burned area which will eventually become necrotic.

Thus, the authors conclude that the failure of the fluorescein to penetrate is not dependent, at least not exclusively dependent, upon the local circulatory condition. The behavior of the fluorescein is ascribed to local stasis, that is, edema, and a number of lesser factors, such as the accrual or flight of electrolytes and the changes in protein concentrations (total and selective) resulting from the changes in capillary permeability.

Eighteen rabbits were used for histologic study of the burned tissues of the ear. The ear of the rabbit is peculiarly suitable for such investigations. It consists of an inner, or nonhairy, surface, and an outer, or hairy, surface and, finally, an intervening, cartilaginous stratum. Here again some unanticipated effects were observed; e. g. there would be a definite heat destruction (carbonization) of the epidermis of the inner surface and an accompanying unexplained destruction of the epidermis of the outer surface This destruction usually affected the cutaneous accessories (hair follicles, sebaceous glands, sweat glands) first, but always with relative immunity of the intervening dermal and cartilaginous tissues. Or, the burn on the inner surface, if sufficiently severe, would result in immediate destruction (necrosis without edematous or blood vascular manifestations) of the epidermal and dermal layers with considerable edema and congestion of the derma under the epidermis of the nonburned side of the intervening cartilage, but without any notable involvement of the cartilaginous layer itself.

Here again, the histological picture does not give any reliable clue with regard to the advent of necrosis; the life tenure of the tissues seems to depend on other factors than the local circulatory conditions of the blood stream. Among such other factors the authors regard as, perhaps, the most important, those leading to local stasis of the interstitial tissues, and changes in the composition of the interstitial fluids, electrolytes, and proteins. Finally, they have concluded that there is a specific burn ferment, which would aid in the explanation of some of the phenomena observed.

On the whole, the authors conclude that, desirable as it would be to be able to predict which tissues in the burn lesion are doomed to necrosis, so that such tissues could be excised and the resulting sclerotic development forestalled by tissue-grafting methods, no detection is as yet available. —*John W. Brennan, M.D.*

The Treatment of Burns with Sterile Gelatin (Die indifferente Trockenbehandlung von Verbrennungen mit Sterilgelatine). B. Weber. *Chirurg*, 1954, 25: 206.

The use of sterile, powdered gelatin in the local treatment of burns has certain advantages over other accepted methods of treatment such as the open treatment, the application of cauterizing protein-precipitating substances, or the use of vaseline gauze and pressure dressings. The gelatin method is technically simple and is quickly carried out; this makes it ideal for use in catastrophes or mass burns. It is applicable to ambulatory treatment of lesser burns. If the treatment is prolonged, a protective bandage can be applied after drying and redusting of the surface with gelatin powder has been carried out. In contrast to open treatment, the gelatin method offers the psychic advantage that the patient does not feel the local treatment is being neglected.

The compatibility of gelatin with body tissues has been demonstrated. It is a bland substance and causes no more reaction than tissue coagulum. In contrast to whole albumin, gelatin is nonantigenic. When in contact with a wound gelatin undergoes biological lysis as a result of the proteolytic action of leukocytic and tissue ferments. This lysis is accelerated in the presence of acute, local inflammation so that the plasma-impregnated gelatin crust over the burn wound does not act to occlude and retain secretions and thus cause the spread of infection.

Gelatin powder is sterile, which is not true of ordinary sheet gelatin. While it is relatively simple to sterilize a gelatin solution, the preparation of bacteria-free, dry gelatin presents a technical problem. To prevent wound infection, it is advisable to add to the gelatin powder an active, bactericidal sulfonamide. The amount of drug added can be relatively small and just sufficient to maintain a bacteria-free gelatin crust, since disinfection of the burn wound itself is practically impossible even with a high concentration of sulfonamide. The general management of the burned patient and shock prophylaxis are the same as for the open treatment.

—*John L. Lindquist, M.D.*

Electrical Accidents; A Discussion with Illustrative Cases. R. H. Dale. *Brit. J. Plast. Surg.*, 1954, 7: 44.

At the beginning of the present century, knowledge of electrical accidents was very limited. The usual attitude on electrical fatalities at that time was that they were inevitable and that nothing could be done to prevent them. Soon, however, more experimental work on animals indicated that electrical deaths were by no means inevitable and that often death had not occurred as soon as was thought.

It has been held, and generally still is, that the cause of death in electric shock is cerebral paralysis and irreversible ventricular fibrillation. Thirty years ago, investigations disclosed that many times an apparent death was merely an inhibition of respiratory and vasomotor centers, and actual death, when it did occur, was due to "internal asphyxia," as manifested by congestion of all of the vital organs. The study showed that prompt application of artificial respiration and its continuance until breathing was restored

or postmortem changes were certain, saved many lives that otherwise would have been lost.

Alternating current appears to be more dangerous than direct, partly because it throws the muscles into tetanic spasms and causes the victim to hold a vise-like grip on the charged object. Direct current is more likely to produce greater local damage. As might be expected, the gravity of the injury does not parallel the voltage. With good contact a voltage of 25 can cause death, and it has sometimes been observed in practice that high voltages have not been nearly as devastating as lower voltages.

Much of the effect depends upon the amount of flowing current. While this relates to the voltage, it also is governed by the contact resistance. Most important by far are skin contacts. The skin when clean and dry is a poor conductor, while dirty or moist skin provides less obstruction to the flow of current. The area of contact and the firmness of the contact greatly influence the flow between the contacts. When only one electrode is concerned, the nature of the underfooting will determine the insult.

The most usual fatal accident in the home occurs when the victim with a perfect grounding of water in the bathtub reaches to a poorly insulated electrical appliance in the bathroom. The result is almost invariably fatal. When the hands are dry, and the contact is a rather loose one, there is a good chance of an electric arc being created between the contact points. The heat from such an arc can be intense enough to melt steel, and the effects on the tissues are immediate and devastating. The local lesion can be anything from a slight electric current mark to massive necrosis of the entire extremity. Where the tissue has been badly destroyed, the lesion is usually bloodless, cold, and painless. The amount of necrosis is usually found eventually to be far greater than was apparent at first. In contradistinction to heat burns, pure electrical injuries produce very little in the way of constitutional effects such as delayed shock, hemoconcentration, and electrolyte derangement. The separation of the dead tissue is extremely slow.

Most of the serious nonfatal cases cited by this author were a result of contact with the so-called "third rail" which, it must be assumed, is prevalent in Great Britain. An unusual happening was that of one of the author's patients, a 5 year old boy, who was urinating from an overhead bridge onto a third rail below; the current, passing up the urinary stream, knocked the child off the bridge onto the same rail. In addition to severe burns on the genitalia, he had numerous deep necroses on other parts of the body.

—*Matthew H. Evoy, M.D.*

A Clinical Study of the Use of Skin Homografts for Burns. DOUGLAS JACKSON. *Brit. J. Plast. Surg.*, 1954, 7: 26.

THE author reports that whenever they have thought it necessary during the past 5½ years, skin homografts have been employed. In a review of over 2,000 seriously burned patients who were treated as in-patients, 1.6 per cent were treated with homografts.

The basic principle of skin homografting is to reduce the size of the open wound as much as possible with the least disturbance to the patient. Although homografting provides only temporary cover, it limits infection, reduces fluid and protein loss, relieves pain, makes dressings less uncomfortable, and improves the patient's appetite and morale. The most common indication for use of homografts was the size of the burn. Where the total skin destruction was over 30 per cent, a most urgent need for early skin covering arose in order to improve the patient's chance for survival. A second indication was to secure skin cover without an anesthetic in a person desperately ill of the complications of the burn. A third indication was the involvement of unimportant areas as well as the hands and face; a temporary covering of the former areas could be brought about while concentrating on securing ideal autografts for the crucial places on the face, neck, or hands.

This author recommends application of the homografts approximately 20 days after the burn is sustained, and advises the simultaneous application of as much autograft as is feasible. It is important to cover the entire denuded area at the first operation, because this surgeon believes that if even as little as 5 per cent of the body remains denuded, there is a steady deterioration of the patient. Whenever possible, the autografts should be used on the face, hands, limb flexures, and other important areas, and also where the new skin is most likely to take well.

It is recommended that when dealing with large denuded areas on the trunk or thighs, alternate strips of autograft and homograft be used, thus setting the stage for spread epithelialization from the patient's own transplanted skin. This method, termed "creeping substitution," has worked out most satisfactorily. The strips in this procedure are 0.5 inch wide.

The homografts, secured from a suitable donor about an hour before the application to the burned patient, survived for an average of 17 days. No unfavorable reaction to the foreign skin was found, and excessive growth of the underlying granulations was prevented by this covering.—*Matthew H. Evoy, M.D.*

Relation of Bacteria to the Failure of Blood-Volume Therapy in Traumatic Shock. JACOB FINE. *N. England J. M.*, 1954, 250: 889.

EVIDENCE is offered that bacterial action may be responsible for the failure of blood-volume therapy in various types of traumatic shock in which infection appears to be absent or of little consequence.

Traumatic shock is a state of acute, persisting deficiency of flow through the peripheral circulation that, if sufficiently severe and untreated, grows progressively worse and is rapidly fatal. The clinical manifestations are low blood pressure, thready rapid pulse, oliguria or anuria, cold, pale, moist skin, and cyanotic mucous membranes. The inevitable consequences of the deficient blood supply to the tissues are reflected in changes in the venous blood, lowered oxygen tension, increase in concentration of lactic, pyruvic, and amino acids, and a decrease in carbon dioxide-combining capacity. The resulting acidosis is aggravated by the accumulation of acid radicals derived from tissue breakdown, which cannot be eliminated because renal excretory function is impaired. Because of stagnation in the peripheral circulation, the return flow from the veins to the heart is reduced, with a con-

sequent decrease in cardiac output per minute, and a fall in oxygen consumption and in the basal metabolic rate.

The commonest cause of the condition is a critical loss of blood volume (35 per cent or more), whether from hemorrhage, tissue trauma, burns, or other causes. Hence, replacement of blood volume deficit is a primary requirement in most cases. If this requirement is met without undue loss of time, a normal circulation is promptly restored, and the chemical changes and clinical signs disappear.

It has been noted, however, that undernourished, feverish, or otherwise sick experimental animals will frequently not respond to adequate blood volume therapy, after having been sick for some hours. The same general considerations apply to hemorrhagic shock in man.

Thus far, the evidence that bacterial action may complicate hemorrhagic shock and be responsible for the development of irreversibility to transfusion has been inferential. It is assumed that if antibiotics protect the subject, they do so by virtue of their antibacterial properties. Recent experiments demonstrate that the bacteria in the liver of a dog in shock increase in virulence as a consequence of a state of shock that is allowed to persist too long. The toxin production resulting from this increase in virulence is lethal to a dog exposed to a relatively brief period of shock. The species of bacteria responsible for the bacterial toxins that produce irreversibility to transfusion have not been identified. If, as a result of hemorrhagic shock, the faculty to destroy bacteria is lost, such bacteria may acquire sufficient virulence to be lethal.

It is said that refractoriness to fluid-volume therapy is often present in the absence of evidence of bacterial activity, but conclusive evidence to exclude a bacterial factor in such cases has not been adduced. Even when fully exploited, ordinary clinical techniques for discovering the presence of pathogenic bacteria may not suffice, for experimental data demonstrate that vascular collapse may be the only evidence of the toxic action of bacteria. It is necessary to consider not only obvious contamination of wounds, but also the possibility of invasion across presumably intact barriers, such as the respiratory and gastrointestinal tracts. Invasion of the body by bacteria, even in the healthy state, is probably going on continuously.

Presumably, many toxins are capable of causing shock that will not yield to fluid volume therapy, but if prolonged hemorrhagic shock, by virtue of the loss of antibacterial defense mechanisms, can invite the added burden of shock due to bacterial action, the same thing may happen in severe and prolonged shock produced by any agent.

Therefore, in the treatment of traumatic shock, however induced, that persists in spite of a restored fluid balance, one should consider the possibility that a superimposed bacterial activity is operating, however remote its likelihood. —*Samuel Kahn, M.D.*

Eight Fatal Anaphylactic Reactions to Penicillin. Abraham Rosenthal. *N. York State J. M.*, 1954, 54: 1485.

The author presents 8 cases in which sudden death occurred following the injection of penicillin. The problem is discussed and the case reports are presented. Autopsies were performed in 6 of the 8 cases. There was no instance of penetration of a vessel by the injecting needle. A review of the types of penicillin used reveals that it was not one type of penicillin, nor even the procaine radical, but rather the penicillin per se which was the sensitizing agent, and thus the responsible agent for the reactions. The injections had been made for a variety of reasons. One death occurred in an 18 month old white female who had never received penicillin previously.

Death occurred within a few minutes in all cases, and none of the many emergency treatments were of avail.

The predominant pathologic finding was pulmonary congestion, frequently of a hemorrhagic type. Many cases showed intense congestion of all viscera on gross examination.

In a majority of the cases, a postmortem history of mild to moderate symptoms of allergy following previous injections of penicillin was obtained.

The conclusion drawn is that the administration of penicillin in any form or by any route must be preceded by careful inquiry into the past history of the patient with respect to the previous use of penicillin, or the existence of an allergic state of any type. Restriction of the use of penicillin to necessary instances and an inquiry into the history of allergic symptoms will tend to prevent the type of catastrophe reported. —*Robert D. Keagy, M.D.*

The Absorption and Distribution of Aureomycin in Man: Review of the Literature and Study of the Concentration of Aureomycin in the Serum, Urine, and Cerebrospinal Fluid After Oral Administration. Buford Hall. *Ann. Int. M.*, 1954, 40: 743.

The distribution of aureomycin among the body fluids has received relatively little attention. This paper summarizes the data of other authors as well as those derived from 400 determinations of the aureomycin content of the sera, the cerebrospinal fluids, and the urines of 87 subjects who received oral aureomycin. Previous reports have been at variance because of differences of assay techniques, individual variations in absorption curves among different subjects, and the inherent difficulty in measuring aureomycin as it is unstable in solution at room temperature.

It is here demonstrated that the serum levels reached within 6 hours after ingestion of 500 mgm. usually exceed the in vitro sensitivity of most strains of organisms susceptible to the antibiotic; that citric acid does not increase the serum levels or decrease gastrointestinal side effects; that aluminum hydroxide gel administered with aureomycin decreases the serum levels of the latter.

Although very little aureomycin reaches the cerebrospinal fluid in the initial half day after ingestion, within 24 hours the levels attained there approach those in the blood.

Varying and usually small amounts of aureomycin appear in nearly all body fluids, including ascitic, pleural, synovial, and pericardial fluids, and milk, and gastric and colon secretions. It crosses the placental barrier. It is concentrated in bile to levels 8 to 16 times higher than in serum.

After several days, up to 50 per cent of any given dosage may be recovered from the urine, although less than 15 per cent of any single dose is eliminated within 24 hours after ingestion. This is so, notwithstanding a urine concentration 100 times that of the blood.

The 24 hour recovery in stool is less than 10 per cent of any given dose. With that the concentration is high, up to 0.5 mgm. per gram of moist feces.

It appears that much of the antibiotic is destroyed by the body. —*Leonard D. Rosenman, M.D.*

Military Surgery in Indo-China (Caractères de la chirurgie de guerre en Indochine). M. GEORGES OLIVIER. *Lille chir.*, 1954, 9: 86.

IN the Indo-China war, wounds of anticommunist military and civilian personnel were caused for the most part by small projectiles (bullets, anti-personnel mines, grenades, and mortars) in contrast to World War II and the Korean War, in which shell and bomb fragments caused most of the wounds.

The front was mobile and indefinite. Often the enemy would take over, during the night, territory held by the French during the day, and then relinquish it the following day. A soldier wounded during the day had a good chance of being evacuated to a surgeon within several hours. However, if he was wounded at night he would not be evacuated until the following morning.

Surgical units were of three orders: (1) base hospitals at Hanoi and at Saigon, (2) secondary fixed hospitals in smaller cities, and (3) mobile surgical units.

The two base hospitals in Hanoi and Saigon were well equipped and well staffed with specialists (approximately 10 surgeons each). The hospitals had air conditioned units and banks for blood, bone, and blood vessels. Anesthesia with a closed circuit was available. These hospitals had busy emergency services and received evacuees from the other units.

Secondary hospitals in smaller cities were often in evacuated civilian hospitals or in school buildings. They were staffed by one or two surgeons and had 100 to 300 beds. They were well equipped and took care of the majority of casualties in Indo-China.

The mobile surgical units were important for troop morale but were able to handle only a limited number of casualties. These units operated near the front lines. Usually they were transported by truck, occasionally by boat or by air and parachute.

Blood banks were maintained in Hanoi and Saigon, and blood was transported by air to forward units. Blood from one of these banks caused many pyrogenic reactions which often caused shock. Transportation, storage, and processing of blood are difficult to carry out in tropical climates.

Pentothal and open drop ether were used as anesthetic agents except at the base hospitals where closed circuit machines were available.

Tetanus was seen frequently in the native unvaccinated civilians but not in the immunized military personnel.

Intestinal parasites often appeared in abdominal wounds but seemed to cause little if any trouble because of the use of modern antibiotics.

—*Frederick W. Preston, M.D.*

ANESTHESIA

Modern Balanced Anesthesia: A Concept. DAVID M. LITTLE, JR., and C. R. STEPHEN. *Anesthesiology*, 1954, 15: 246.

BALANCED anesthesia had its origin in the theory of anociassociation by George Crile in 1911. He argued that the brain must not only be protected against destructive psychic strain by the use of general anesthesia, but must also be guarded from noxious impulses arising from the site of surgical intervention.

Lundy coined the term "balanced anesthesia" in 1926. This was the use of a combination of anesthetic drugs and methods so balanced that the burden of the relief of pain would be borne by all the drugs used—by preliminary medication, regional anesthesia, and light general anesthesia.

The introduction of propylene in 1930, pentothal in 1934, and curare in 1942, led to the development of their combinations in light planes of anesthesia, and thus avoided the profound physiological disturbances of deep anesthesia.

The idea of modern balanced anesthesia has evolved from this concept.

Thus the tools of modern balanced anesthesia might include combined anesthetic methods, such as hypnosis with pentothal, analgesia with nitrous oxide or ethylene, muscular relaxation by means of curare, adequate oxygenation, removal of waste products (CO_2 and heat), control of reflex activity, maintenance of circulation, acid base and electrolyte equilibrium (prevention of shock during anesthesia), and the prompt return to the preoperative physiological status quo.

The application of the basic principles evolved was illustrated with several case reports.

Modern balanced anesthesia, though far from perfect, has transformed anesthesiology from the realm of the purely technical in its simplest meaning to that of the professional in its fullest significance.

—*Ippu Fukuda, M.D.*

Narcosis and Anesthesia; Controlled Lowering of the Blood Pressure and Peridural Anesthesia (Narkose und Anaesthesie; Kontrollierte Blutdrucksenkung und Periduralanaesthesie). H. LANG. *Chirurg*, 1954, 25: 181.

IN ALL fields of surgery, controlled reduction of the blood pressure is being used more frequently to prevent or control bleeding during the operation in order to leave a clearly visible field with as little blood loss as possible.

At the Urologic Clinic at Homburg, the blood pressure reducing properties of peridural anesthesia have been utilized. The idea of total exclusion of the spinal roots for surgical purposes is not new. With medical blocking of the whole vegetative system with so-called ganglion blocks it is permissible to use the sympathetic effect of spinal anesthesia and peridural anesthesia to reduce bleeding. For anesthesia the sympathetic, sensory, and motor roots are paralyzed; for analgesia, exclusion of pain is accomplished by weaker modalities, and for block the predominant effect is on the sympathetic fibers. The technique of total spinal block as administered by Griffiths and Gillies is described in detail. Systematic studies of the blood pressure before, during, and after operation

have shown that the drop in blood pressure obtained with pantocain is more certain and more easily regulated than that following exclusion of the sympathetic roots, so that collapse may to a great extent be avoided and the peripheral reduction in circulatory tension can be utilized to reduce bleeding.

The analgesic, relaxing, and hypotensive effects of pantocain in peridural anesthesia begin and end practically simultaneously, a fact that has not been sufficiently emphasized or noted. There are three phases, namely, the phase of sudden change in the blood pressure during the induction of anesthesia, the phase of labile equilibrium during complete anesthesia, and the phase of recovery during diminishing anesthesia. During the latter the blood pressure and pulse rate increase gradually until the original level is attained. In extremely rare and very dangerous cases, the body has lost its capacity for compensation and a complete peripheral circulatory decompensation persists throughout the duration of the peridural anesthesia; this demands constant regulation of the peripheral circulation before, during, and after operation. Prophylactic circulatory stimulants will prevent collapse temporarily, but in single doses have only a delaying effect. When their effect becomes gradually less, uncontrollable and frequently fatal collapse cannot be prevented.

Leonhardt's neurogenic hypotension by subarachnoid or peridural exclusion of the sympathetic roots for the control of the blood pressure is not very dangerous if certain basic principles are considered. The Trendelenburg position must be maintained to permit an adequate venous reflux as well as favorable hemodynamic conditions for the brain. Adequate gas exchange must be maintained.

On the basis of the experiments on dogs by Griffiths and Gillies, which showed that the administration of a pure vasopressor in the hypotonic phase will bring the blood pressure back to the initial level but simultaneously will reduce the minute volume dangerously, Beecher, Brewster, and their coworkers have shown that the administration of quite small doses of adrenalin will largely prevent this reduction.

Accordingly, in peridural anesthesia the procedure is as follows:

1. The patient is placed in the horizontal position as soon as possible or, better still, in a Trendelenburg position of 20 degrees to facilitate the venous reflux to the heart. This will in itself help to prevent collapse.

2. In cases with severe collapse, active artificial respiration is administered through the closed system of the narcosis apparatus. Treatment of the circulatory disturbances is here of secondary importance, since the greatest danger lies in failure of the peripheral respiratiom.

3. Adrenalin was selected as a stimulant for the peripheral circulation because it simultaneously stimulates the cardiac activity.

The degree of hypotension thus obtained was measured in a series of 100 patients. In 99 cases the blood pressure dropped without the administration of other hypotensive agents. In 76 cases, the blood pressure dropped to between 80 and 100 mm. Hg., and in 23 cases to between 100 and 120 mm Hg. In 7 patients, circulatory danger was signaled by nausea, yawning, pallor, or sweats. Collapse was easily prevented and there were no deaths or postoperative complications such as hypoxemic organic lesions.

It is concluded, therefore, that while peridural anesthesia is suitable for bringing down the blood pressure, one limitation must be recognized, namely, that the technique will be the determining factor.

For many years the author has used the 20/00 aqueous pantocain solution with adrenalin for all major urogenital operations, more than 2,000 cases. Between 30 and 45 c.c. of the aqueous solution are injected. Following puncture of the peridural space in the usual manner, at a segment corresponding to the planned operation, 5 c.c. of the 20/00 solution are injected after the location of the needle point is checked. If no marked change in pain, movement, or blood pressure level is observed after 5 minutes, 30 to 45 c.c. of the adrenalin solution are injected in 10 to 12 minutes. The needle is removed and the patient is immediately placed in a moderate Trendelenburg position. Immediately thereafter, a slow intravenous drop infusion of 5 per cent glucose solution is begun to insure quick and sure access to the blood stream. To suppress the vegetative system and consciousness, the patient is given an intramuscular injection of 100 mgm. of dolantin and 50 mgm. of atosil mixed in a syringe.

Further procedure is determined by the intensity of the pantocain effect and the corresponding reaction of the patient. If the blood pressure falls rapidly, as is usual in hypertensive patients, an intramuscular injection of veritol is administered, which has an effect lasting from 15 to 20 minutes; during this time the blood pressure first drops slowly and then rises. The pantocain effect on vascular innervation is thus selectively and transitorily weakened, although not completely inhibited. The pulse and blood pressure are taken every 3 to 5 minutes and later every 10 to 15 minutes. After at least 45 minutes, anesthesia and reduction of the blood pressure are attained. The patient is then placed with the site of operation at the highest point, as is usual for kidney operations and offers no difficulties in bladder operations.

The blood pressure then drops again to levels between 70 and 60 mm. Hg. From the beginning of this fall in blood pressure, the patient is given abundant oxygen. Further procedure cannot be described schematically. The patient lies still, usually with his eyes closed. The skin appears rosy and dry, but often has a slightly livid undertone. Except for some weakness, the general condition is good. If slight nausea develops when the systolic pressure drops below 70 mm. Hg, it may be combated by slight elevation of the limbs and a more acute Trendelenburg position, which will raise the blood pressure and increase the pulse rate. Should pallor and sweats develop, the continuous administration of tiny doses of noradrenalin through the more rapidly flowing infusion will improve the peripheral tonus and volume substitution. It should be noted that with the kidney in the "jackknife" position, there may be further inhibition of the respiratory volume due to mechanical constriction of one-half of the lung. Should collapse threaten following the initially constant blood pressure levels, and

other causes can be excluded, the cause may be inadequate pulmonary ventilation. Artificial respiration will quickly dispel this danger. In controlled hypotension, as well as in collapse, observation of the gas exchange is of at least equal importance as that of the peripheral circulatory tension.

Due to anatomotopographic factors, it is quite possible that with segmentally limited anesthesia the drop in blood pressure and analgesic effect may be of only slight degree. In such cases, the author has lately administered small doses (20 to 50 mgm.) of pendiomid with simultaneous intensification of the vegetative block. Mild pain is then hardly noticed by the patient. The hypotensive effect is likewise increased in peridural anesthesia with pendiomid. The duration of the effect of single doses is short, from 3 to 10 minutes, after which the blood pressure level tends to return to that attained with the peridural anesthesia and remain there. Hitherto, the author has found the simultaneous use of pendiomid and peridural anesthesia for lowering the blood pressure in suitable cases to be safe and successful. No ill effects were observed. However, clinical experience is not yet sufficient to permit final conclusions. Pendiomid can be used safely only in the second phase of anesthesia since it is only then that the blocking effect of the pantocain on the sympathetic system can be definitely ascertained.

The combination of peridural hypotension with block of the vegetative system in the sense of a "potentiated narcosis," or "hibernation," produces, in addition to a distinct psychic dullness, a lowering of the basal metabolism and oxygen requirement. Thus, through stabilization of the vegetative system a prophylaxis against shock is also obtained. Pendiomid exerts a similar effect, but as it also has a hypotensive effect it is indicated only in special cases.

The current surgical interest in artificial lowering of the blood pressure encouraged the author to publish his experiences, so that also his method, which to his knowledge has not hitherto been reported in the literature, should be further tested and discussed.

—*Edith Schanche Moore.*

Controlled Hypotension with Arfonad, with Particular Attention to Neurosurgical Operations (Ipotensione controllata con Arfonad (RO 2-2222) con particulare riguardo agli interventi di neurochirurgia). GUIDO MORICCA. *Rass. internaz. clin. ter.*, 1954, 34: 362.

THE author discusses the pharmacology, and the experimental and clinical effects of arfonad with particular reference to neurosurgical procedures. Of the many methods used to control hemorrhage and hematoma formation in intracranial surgery, the most favorable results obtained to date are those in which the new technique of controlled hypotension is employed. Ganglioplegic agents have been used to block the neurovegetative and sympathetic pressor reaction and thereby maintain the blood pressure at desired hypotensive levels to reduce the incidence of operative hemorrhage.

Arfonad, a ganglioplegic agent, has been found to have definite advantages over other similar preparations. Following intravenous injection, arfonad immediately induces a drop in blood pressure which can be accurately sustained at the desired level of hypotension. This product undergoes rapid metabolism in the body, and therefore does not produce cumulative effects. The author affirms that a small percentage of this compound can be detected in the urine following administration. Within 5 to 10 minutes after completion of the injection, the blood pressure returns to the normal preinjection level. Because of the profound hypotension and hemostasis that occurs, proper oxygenation of the blood should be maintained by the administration of supplementary oxygen. The author is of the opinion that this can be accomplished by means of a nasal mask, thus obviating the necessity of an endotracheal tube which would require a deeper plane of anesthesia.

The dosage of arfonad is individualized. There is a wide variation of response from different individuals, although the degree of response in one individual remains fairly constant. Therefore, the quantity of arfonad to administer is directly determined by careful observation of the blood pressure changes that occur following injection.

The method described was used in 12 patients having neurosurgical operations and in 28 general surgical procedures. In the neurosurgical cases, the procedure was combined with luminal for narcosis, and novocain for local anesthesia. This combination provided favorable conditions for removal of meningiomas and gliomas of the brain. The method was also credited with producing a reduction in the incidence of postoperative cerebral edema.

The hypotensive technique has also given favorable results in vascular, orthopedic, cardiac, and plastic surgery. The author also advocates the use of the hypotensive technique in nonsurgical conditions such as pulmonary edema and traumatic cerebral edema.

Contraindications to the use of this preparation are: coronary heart disease, myocarditis, arteriosclerosis, aortitis, anemias, and renal or hepatic insufficiency. The use of this preparation requires the constant observation of a trained anesthesiologist who can institute proper resuscitative care and intubation when indicated.

—*Roland A. Manfredi, M.D.*

The Control and Management of Hypertensive Crises Developing During Surgical Procedures. ALEXANDER M. RISKIN, DEMENICO SEMERARO, and RAPHAEL W. ROBERTAZZI. *Anesthesiology*, 1954, 15: 262.

HYPERTENSIVE crises occasionally develop during anesthesia for various surgical procedures. Acute hypertension, observed most frequently, follows transection of the spinal cord at the fifth thoracic level or above. The so-called "mass autonomic reflex" (conspicuous rise in blood pressure, marked decrease in pulse rate, and marked vasodilatation in the neck, face, and nasal mucosa) occurs when the bladder is filled during cystoscopic examination. Hypertension may also develop during thyroidectomy for Grave's disease or craniotomy.

Hexamethonium bromide C_6, one of the ganglionic blocking agents, has proved to be most satisfactory for control and management of hypertensive crises.

Several cases are reported in detail to show the effectiveness of hexamethonium bromide in the control of this condition.

—*Ippu Fukuda, M.D.*

The Determination of Cardiac Output by the Dye Dilution Method: Modifications, Comparison with the Fick Method, and Application During Anesthesia. BENJAMIN E. ETSTEN and T. H. LI. *Anesthesiology*, 1954, 15: 217.

THE authors compare the Fick method and the dye method of determination of cardiac output.

In the Fick method a determination is made of the amount of oxygen consumption (spirometer technique using endotracheal tube). The oxygen content of the pulmonary artery, containing venous blood, is then determined by means of cardiac catheterization and compared with the oxygen content of the arterial blood of the femoral artery. The cardiac output is calculated by these relationships.

In the dye method a solution of T-1824 is injected into the external jugular or median basilic vein. Arterial blood from the femoral or brachial artery is collected into tubes every second by a special apparatus. The dye concentrations in these tubes are read by spectrophotometry. The cardiac output is calculated from the dye concentration curve.

Modifications of the dye method were given.

The dye method does not need the accurate determination of oxygen consumption, nor does it present the technical difficulties or complications of cardiac catheterization. It is simpler and safer than the Fick method.

The satisfactory agreement of the results of the dye method with those of the Fick method, the reasonable precision, and the advantages of the dye technique over the Fick method indicate its usefulness for the determination of cardiac output during the anesthetized state in human subjects.

—*Ippu Fukuda, M.D.*

A Survey of Spinal Anesthesia from 1949 Through 1952. ROBERT W. GRADY, JOHN A. STOUGH, and E. B. ROBINSON, JR. *Anesthesiology*, 1954, 15: 310.

THE authors attempt to evaluate spinal anesthesia on the basis of 2,300 cases observed over a period of 4 years at the Lloyd Noland Hospital, Fairfield, Alabama.

Spinal anesthesia was employed as the anesthetic of choice for all intra-abdominal surgery and for many other surgical procedures. The management of the patients both before and during operation, the technique, and the complications both during and after operation were discussed in detail.

Pontocaine was the agent used for single injection spinal anesthesia, and procaine for continuous spinal anesthesia.

The dosages of pontocaine were 6 mgm. for saddle block, 10 to 12 mgm. for lower spinal, and 15 to 18 mgm. for high spinal anesthesia. A 10 per cent dextrose solution was used as the weight agent. If a long-acting spinal anesthesia was desired, 2 to 5 mgm. of neosynephrine, or 0.5 c.c. of 1 to 1,000 epinephrine, were added to the solution, to be injected intraspinally. The results were satisfactory in a high percentage of cases.

A comparison is made of five different vasoconstrictors: methedrine, vasoxyl, wyamine, clopane, and oenethyl. Each of these substances proved to be satisfactory.

The use of supplemental agents such as pentothal nitrous oxide, nembutal, or seconal is reviewed.

It is the belief of the authors that spinal anesthesia has proved to be quite safe when used with selectivity and constant awareness of its advantages as well as its limitations.

—*Ippu Fukuda, M.D.*

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Fractures (Fatigue Fractures) of the Ribs from Coughing [Hustenfrakturen (Ermuedungsbrueche) der Rippen]. O STARKE. *Fortsch. Roentgenstrahl.*, 1954, 80: 191.

FIFTEEN patients with 35 costal fractures have been observed on the author's service. In 8 of these patients one rib only was fractured and in 7 the break was on the right side. In the remaining 7 patients more than one rib was broken, either concomitantly or successively, and in 5 of these 7 with multiple costal fracture the fractures were limited to one side of the chest (3 on the right and 2 on the left); in the remaining 2, both sides were involved.

Taken as a whole, 22 of the 35 fractures were located on the right side and 13 on the left. The fifth to the eighth ribs were involved 24 times (14 on the right and 10 on the left), and the ninth to the twelfth ribs 11 times (8 on the right and 3 on the left).

In 6 of the patients the costal fracture was initiated by an audible "cracking" sound and the incident was accompanied by a sudden, severe, stabbing pain at the point of fracture. In these instances with symptoms the dislocation of the fracture ends was usually considerable.

In 9 of the patients the tussive costal fractures were practically without symptoms and were, in fact, unnoted at the time, even when several ribs gave way simultaneously. In these instances the line of fracture or separation (passing through a zone of Looser) was a chance finding and there was little or no dislocation of the fracture ends. In these nondislocated fractures the tendency toward healing was better than in the instances with dislocation.

In only 1 case was the fracture complicated; the patient was a 45 year old woman who, following severe attacks of cough, developed breaks in the sixth, seventh, and eighth ribs in the posterior line on the right side. The break occurred with an audible "cracking" sound and sudden, severe pains, and at the hospital a hemothorax was found on the right side.

The costal fracture may heal, but with renewed attacks of coughing a new fissure may develop in the same area or within the surrounding Looser zone. In these cases stratigraphy has been of inestimable value, permitting, as it does, a view of the ossifying events without interference by the superposition of the shadows of the overlying and underlying bone structures. In 1 instance, that of a 52 year old man with chronic emphysematous bronchitis and bronchial asthma, a moderate degree of scoliosis was present and the break of the sixth to the tenth ribs on the right side occurred on the side of the greatest arch of the spine. Later, after these fractures had healed, a fracture of the seventh and eighth ribs occurred on the same side. Thus it would seem that scoliosis might also exercise a contributing influence in these tussive costal fractures.

For these fractures special prophylactic or curative therapeutic methods are neither known nor apparently necessary, other than treatment of the cough and its causative condition. There seems to be no other evidence of bone disease than the fracture itself and such expedients as chest strapping with adhesive plaster seem neither to prevent the occurrence of the break nor to assist in its healing. However, strapping is sometimes resorted to in an effort to control the pain.

The author believes that under conditions in which this type of rib fracture could develop it should be roentgenologically sought with great diligence, because such a fracture may, on occasion, prove of considerable medicolegal significance.

—*John W. Brennan, M.D.*

The Frequency of Bronchial Carcinoma Under the Mask of the Middle Lobe Syndrome (Ueber die Haeufigkeit des Bronchialkarzinoms unter der Maske des "Mittellappensyndroms"). K.-H. UEBERSCHÄR and H. HASCHE. *Fortsch. Roentgenstrahl.*, 1954, 80: 208.

Two case histories of bronchial carcinoma masked as "middle lobe syndrome" are appended. These two cases have been selected as illustrative of the matter under discussion, since they present all aspects of the problem under consideration. They have been chosen from a group of 20 cases in which it was found that 50 per cent of instances of this syndrome proved to be bronchial carcinoma. Thus, the authors believe that the 3 per cent of bronchial carcinomas with this complex of symptoms, usually cited in the literature, is probably too low a figure, and that in every instance of middle lobe syndrome the possibility of the presence of bronchial carcinoma should always be considered as a possible cause.

The first instance reported was that of a 50 year old patient who had been suffering for 10 months of cough, expectoration, weakness, sweating, loss of weight, and moderate rises in temperature. The sputum was sparse in amount and was never intermixed with blood. There were attacks of pain in the right side of the chest.

The roentgenologic examination disclosed total atelectasis and contraction of the right middle lobe. There were flecks of calcareous shadow in the lateral segment of this lobe, in the root of the lobe, and in the region of the right hilus.

Tomography failed to disclose the middle lobe bronchus and a tumor shadow could not be demonstrated. Bronchography showed a funnel-shaped closure of the middle lobe bronchus about 1 cm. from its origin. Bronchoscopy uncovered only a funnel-shaped pit at the expected place of the aperture of the bronchus of the middle lobe.

A pneumonectomy was done and an infiltrating small-celled cancer of the right middle lobe bronchus with bronchial blockade was discovered. The growth had occurred intrabronchially and there was no peribronchial infiltration (no tumor shadow).

The second case was that of a 44 year old patient who had been suffering for about 4 months from cough and expectoration; recently there had been traces of

blood in the sputum. There were burning pains in the right anterior region of the chest. Three months previously a roentgenogram had revealed total atelectasis of the middle lobe with a clearer area in the medial segment, suggestive of abscess. Later the infiltration had regressed until it was present only in the shrunken medial segment of the lobe.

Tomography now disclosed a normal bronchial lumen with smooth outlines. The lumen of the bronchus to the lower lobe was indented on its medial contour, but not seriously constricted. There was no tumor shadow.

Bronchography failed to demonstrate the bronchial branch to the medial segment of the middle lobe. At the point where it should appear there was a small pitlike indentation.

Bronchoscopy showed the origin of the bronchus to the middle lobe to be free of obstruction, and its walls were believed to be of normal appearance.

Pneumonectomy was performed and a small-celled carcinoma was found. The new growth had developed predominantly peribronchially and had constricted the bronchus to the medial segment of the lobe. It had also grown in the form of peglike extensions into the pericardium; radical removal was now impossible.

Judging by these two instances, it appears that cancer can be present in the middle lobe syndrome without the classical signs of bronchial carcinoma, that a differential diagnosis between the middle lobe syndrome and bronchial carcinoma cannot always be made with certainty, and that waiting for certain signs of carcinoma to appear may result in the finding, at operation, of an inoperable condition. Nevertheless, the authors believe that a proper attitude towards the complex of symptoms may prove valuable in the early discovery of bronchial cancer at a time when it is still operable. —*John W. Brennan, M.D.*

The Influence of Bronchial Carcinoma on the Respiratory Movements of the Tracheobronchial Tree, the Diaphragm, and the Thorax (Die Auswirkung des Bronchial-Karzinoms auf die Atembeweglichkeit des Tracheobronchialbaumes, des Zwerchfelles und des Brustkorbes). H. BRUECKNER. *Fortsch. Roentgenstrahl.*, 1954, 80: 439.

THE author has extended his field of research to cover pathological conditions of the chest organs and reports on the pathological aspects of his studies. For the basic discussions of the efficient use of his method of roentgenologic examination of the chest, the reader is referred to his dissertation written in 1946, which was published eventually in the *Zschr. Anat. Entw.*, 1952, vol. 116.

The method consists essentially in the taking of 2 roentgenograms, the one at the instant of maximum inspiration and the other at the instant of maximum expiration. The roentgenographic images thus procured are then traced through transparent paper and one of the two tracings is superimposed upon the other. The author contends that this method is just as accurate for measuring purposes as kymography and is not so time-consuming. The most important shortcoming of the method is that the measurements are not true values but the apparent values as affected by the conditions of projection; however, for the purposes here envisaged, such considerations are not of serious import, since the object, in last analysis, is only the procurement of comparative values taken upon one and the same object.

With this method the influence of bronchial carcinoma on the respiratory movements of the tracheobronchial tree, the thoracic cage, and the diaphragm were studied in 46 cases. It was found that the inoperable cancer presented the most marked disturbance of mobility, particularly respiratory mobility, and that the hindrance placed on the respiratory excursions of the bifurcation of the trachea are the easiest to see and the most significant as a diagnostic measure.

A number of sketches are appended to the original text which illustrate the advantages of the method, and particularly a number of tables which show the progressive loss of excursion in consonance with the nearness of the tumor to the lung hilus, with the increasing amount of adhesions, and with the operability versus inoperability of the tumor itself.

Of course, the author does not maintain that any of these signs of themselves solve the question of operability; however, when these measurements are taken with the aid of the bronchogram and are collated with all other possible diagnostic and prognostic modalities, it will at times be possible to resolve the problem of operability. —*John W. Brennan, M.D.*

The Respiratory Esophagogram, a Helpful Expedient in the Demonstration of the Presence of Bronchial Stenosis (Das Veratmungs-Oesophagogramm, ein Hilfsmittel zum Nachweis der Bronchostenose). W. D. SCHOENHEINZ. *Fortsch. Roentgenstrahl.*, 1954, 80: 453.

THE author's service has undertaken the study of the movements of the mediastinum in the same manner and with the same objectives as those reported by Liebschner and Vieten (*Fortsch. Roentgenstrahl.*, 1952; *Internat. Abst. Surg.*, 1953, 96: 196). Liebschner and Vieten, in order to obviate the disadvantages of the native image, that is, the exposure made without the aid of contrast material, combined the usual respiratory method with the bronchographic method.

Since the bronchographic method is not applicable outside of hospital practice, the esophagographic method, instead of the bronchographic method, was used. With this method the patient lies on his back and is given a swallow of contrast material of thick consistency. Four exposures are then made, two at the moment of maximum inspiration and two (using the two halves of the same film) at the moment of maximum expiration. The movements of the mediastinum (or of the esophagus) are then measured against a lead marker which has previously been applied to the chest wall with adhesive plaster.

This method has now been applied in 18 instances of bronchogenic carcinoma, and in 16 the findings were substantiated at autopsy.

On the basis of the findings procured the author is able to recommend the measure as a simple, rapidly effective method of examination. The inspiratory movement of the mediastinum on the affected side enables the examiner to secure with considerable exactness a differential diagnosis between bronchial carcinoma, including involvement of the hilus glands, and central pneumonia. However, when no medi-

astinal movement is observed, or when it occurs in the contralateral direction, that is, the movement upon deep inspiration occurs toward the well side, and all the more when there is present a concomitant unilateral or bilateral disturbance of the functioning of the diaphragm, the interpretation must be made with great caution.

The purpose of this report is to suggest a simple method for determining mediastinal movement during respiration, especially since such directions do not seem to have appeared in the literature as yet.

—*John W. Brennan, M.D.*

Intussusception in Infants and Children, with Emphasis on the Recognition of Cases with Complications. JI-TOONG LING. *Radiology*, 1954, 62: 505.

INTUSSUSCEPTION has been described by many authors as the most common cause of acquired intestinal obstruction in infants and children. However, the author's experience indicates that this condition is generally a nonobstructive process. The most common complications of intussusception are gangrene of the intussuscepted bowel, peritonitis as a result of the migration of organisms through the intact wall of viable intussuscepted bowel, and the presence of an underlying tumor or other lesion as a leading point.

The records of 42 children treated for intussusception at the Children's Hospital in Cincinnati, Ohio, from 1947 to 1952, inclusive, were reviewed in an effort to determine if complications of intussusception could be predicted before the institution of treatment. Thirty-nine of the cases were surgically verified. Hydrostatic pressure reduction was successful in 3 cases, in 1 of which operation had been done at each of two previous admissions for apparently uncomplicated intussusception. Thirty-two of the surgical cases were found to be uncomplicated, but complications of varying nature were present in the remaining 7 cases. The duration of the pathologic process would appear to be a determining factor in the production of necrosis of the bowel and in the migration of organisms into the peritoneal space through the intact bowel wall. However, this assumption was not proved.

In the group of 35 uncomplicated cases the interval between the onset of symptoms and roentgen diagnosis ranged from a few hours to several days. Six of the patients without complications were admitted on the fourth day after onset, and 4 more were admitted from 7 to 14 days after onset. It is apparent that many of the children who recovered from intussusception and who were untreated for more than 4 days must have had a nonobstructive or nonstrangulating process.

In the 7 cases with complications, the longest interval from the onset of symptoms to admission was 4 days, and this occurred only in 1 instance. In a case complicated by necrosis of the ileocecal valve, admission was approximately 4 hours after the onset of symptoms. These observations indicate that the duration of intussusception did not play a significant role in determining the presence or absence of complications.

In a child with characteristic clinical picture of intussusception, the abdomen is soft and relatively nontender. The usual symptoms are those of a sudden onset of paroxysmal pain and vomiting. Blood and mucus in the stools are relatively late manifestations. Occasionally a mass is palpable and directly over it a slight muscular resistance may be observed. Such a palpable mass is the surest diagnostic sign, but it is not invariably present. Complications alter the physical findings. These are usually heralded by the evidence of intestinal obstruction and/or peritonitis: distention, generalized muscular guarding, diffuse abdominal tenderness, and alteration in the bowel sounds.

In the uncomplicated group, examination of the abdomen was negative on admission in 9 cases. A definite mass was palpated in 18 cases, 7 of which also had slight rigidity or tenderness localized over the mass. In the remaining 8 cases there were slight localized resistance and tenderness, but no mass. Among the 7 cases with complications, generalized tenderness and varying degrees of distention were present in 5 instances. In the remaining 2 cases, one complicated by generalized peritonitis and the other by necrosis of the ileocecal valve, the abdominal examination was surprisingly noncontributory, except for the mass.

There was a wide range of temperature in the cases so that no information of significance for diagnosis could be derived. Leukocytosis varied greatly so that it was not considered a significant manifestation of intussusception with complications. Preliminary plain films of the abdomen are important. In the presence of intussusception the films may be "normal". At times there may be complete absence of gas shadows on the right side of the abdomen, although considerable gas is present in the bowel on the left side. An explanation of this is that the intussuscepting loop (intussusceptum) forces the gas out of the cecum and ascending colon (intussuscipiens) at the same time that the external compression by the intussuscipiens forces the gas out of the incarcerated ileum. A soft tissue shadow may be found at any location in the large bowel. A barium enema is conclusive in the diagnosis of ileocolic intussusception and should be used in all doubtful cases and for hydrostatic pressure reduction of the uncomplicated intussusception.

Recent reports point to roentgenologically controlled hydrostatic pressure reduction as the best treatment for uncomplicated cases in infants and children. It is believed to be less traumatic to the bowel than manual reduction at open operation. The author believes that controlled hydrostatic pressure reduction should be the treatment of choice for uncomplicated intussusception. Such a procedure is to be avoided in cases presenting roentgen or clinical evidence of complications.—*Frank L. Hussey, M.D.*

The Roentgen Manifestations of Relapsing Pancreatitis. MAXWELL H. POPPEL. *Radiology*, 1954, 62: 514.

RELAPSING pancreatitis is a disease of recurring exacerbations separated by varying intervals of seemingly relative clinical quiescence. At any given time it represents the summation of all previous episodes. The roentgen manifestations of relapsing pancreatitis can be divided into two groups: (1) those indicating an acute or a subacute exacerbation and (2) those indicating chronic pancreatitis. The papillary sign is the

earliest roentgen indication of a sudden subacute or acute exacerbation, the vaterian papilla becoming enlarged as a result of edema. If the inflammatory condition is severe, the edema spreads from the papilla as a center and involves the contiguous duodenal mucosa in all directions. The papillary enlargement, however, at the center is always the greatest. It reflects the underlying inflammatory condition, increasing and decreasing almost daily with the degree of inflammation. Its recognition in a case of known chronic pancreatitis is pathognomonic of a relapse. In other instances, it at least indicates a regional inflammatory condition. The next roentgen manifestation may be a functional disturbance in the duodenum. This may take the form of a change in motility (usually an increase), altered peristalsis, the presence of retroperistalsis, localized evanescent areas of spasm, intolerance to barium, and modification of the usual pattern of barium distribution.

When the pancreatic head becomes sufficiently enlarged and the irritability is abated there are noted widening of the duodenal loop and pressure on its inner concave border with displacement of the loop toward the right. Duodenal ileus occurs at a still later stage. In the late stages the duodenal loop may become irregularly distorted and obstructed. When the pancreas enlarges, there are usually a uniform elevation of the stomach and flattening of the greater curvature, associated with a slight forward displacement. Tenderness over the pancreatic area may occur. This later extends toward the costovertebral angles when the retroperitoneal tissues are involved. Later, there may be a palpable mass or roentgen appearance of increased density in the region.

In the presence of a gas-bacillus infection of the pancreas, locules containing gas and fluid can be demonstrated, along with numerous fistulas. Inflammatory tumefactions or collections may be visualized as localized space-occupying lesions when the acute inflammation extends beyond the confines of the pancreas. These may be in the retroperitoneal area behind the pancreas, in the lesser omentum between the stomach and liver, in the lesser peritoneal sac, in the gastrocolic ligament between the stomach and transverse colon, or high up under each half of the diaphragm in the subphrenic regions.

On cholangiographic examination the common bile duct may exhibit narrowing and wavy undulation in that portion related to the pancreatic head. There may be spasm and irritability in the midportion of the transverse colon. Opaque calculi may seen in the biliary tract. There may be irritability of the upper jejunum. The mucous membrane may become edematous and present a coarsely feathered appearance. When the pancreas enlarges, it may displace the duodenojejunal junction and the upper jejunum downward and slightly forward. There may be localized ileus in the small bowel or colon. Varying amounts of fluid or exudate may be present in the peritoneal cavity as evidenced by a uniform increase of density and absence of normal organ outlines. The left kidney shadow and the lateral margins of the left psoas muscles may become indistinct.

The manifestations of chronic pancreatitis are calcareous deposits in the pancreatic parenchyma, calculi in the pancreatic ducts, and calcifications in pancreatic pseudocysts or cysts; localized masses in the pancreas and in the parapancreatic area; an increase in the midline retrogastric soft-tissue diameter; adhesions to the stomach and duodenum. Pancreatic steatorrhea results in a nonspecific finding of a "disordered motor function" of the small bowel. There may be changes in the common bile duct. Nonspecific osteoporosis is found. There may be enlargement of the liver when there is extensive destruction of the pancreas. —*Frank L. Hussey, M.D.*

Renal Tumors with Reference to Pneumoretroperitoneum (Ueber Nierentumoren im Pneumoretroperitoneum). R. HAUBRICH. *Fortsch. Roentgenstrahl.*, 1954, 80: 242.

THE author discusses 6 cases of various forms of involvement of the kidney and/or contiguous organs and tissues, with regard to the diagnostic, differential-diagnostic, and prognostic benefits to be derived from the pneumoretroperitoneal method of examination. The diagnosis of all these conditions was subsequently substantiated by means of operative and histologic findings.

In the first case the condition was simply a suspected polycystic kidney on the left side and the pneumoretroperitoneum demonstrated a cyst also in the right kidney. The honeycombed appearance at the lower pole of the left kidney was merely a sequela of an old perirenal sclerotic process.

The second case consisted of a hypernephroma. The tomogram, combined with presacral insufflation, demonstrated not only a nodular contouring of the upper pole of the kidney, but an incomplete air-sickle enveloping the organ, and bridgings across the air space of tumor tissue invading the surrounding tissues.

The third case was that of a malignant tumor of the right kidney, in which the pneumoretroperitoneal technique permitted the prognostication of inoperability, since the air-sickle was interrupted along the upper and medial border of the renal contour. Operation revealed a malignant tumor with capsular penetration and involvement of the para-aortal lymph nodes.

The fourth case was, again, a malignant tumor of the right retroperitoneal space. Here the pneumoretroperitoneal examination enabled the distinction between a renal or peritoneal tumor and a giant hydronephrosis. The differential distinction was made on the basis of extensive interruptions of the air-sickle by invasive tumor tissues.

In all these cases of malignant tumor, the findings with air insufflation were prognostic rather than differential-diagnostic, since similar appearances could be produced by perirenal adhesions; therefore it is best not to depend upon the method to diagnose the nature of the renal involvement primarily.

The fifth case was that of a gigantic traumatic renal hydronephrosis. The sharply projected contours observed on injection of air into the perirenal tissues enabled the author to distinguish this condition from malignant tumor.

The sixth instance, finally, was that of a huge hematoma beneath the kidney proper, which caused a partial blocking of the ureter and a moderate sized hydronephrosis.

In conclusion, the author states that the combined pyelographic and pneumoperitoneal methods should be resorted to in all instances when the ordinary techniques offer difficulties. Under some circumstances this combined method should be supplemented by tomography. —*John W. Brennan, M.D.*

The Formation of Accessory Ossification Centers in The Presence of Normal, and of Disturbed, Epiphyseal Ossification and Their Relationship to Aseptic Necroses (Die Nebenkernbildung bei der normalen und gestoerten Epiphysenossifikation und ihre Beziehung zu den aseptischen Nekrosen). G. LIESS. *Fortsch. Roentgenstrahl.*, 1954, 80: 153.

THREE cases of disturbed epiphyseal development are reported.

The first case was that of a 6 year old boy with disturbed epiphyseal growth, who had fallen and hurt his knee. Two years after the traumatic episode, pain and swelling developed in the injured knee and since then (for 3 years) there has continued to be some evidence of chronic infection in the injured joint. The involved leg is now 2 cm. longer than its mate. A number of roentgenograms taken in this patient at various times show the development and gradual fusion of accessory centers of ossification, mainly in the region of the medial condyle of the femur.

The second case was that of a 12 year old girl who, with particular reference to the thyreotropic hormones, showed evidence of retardation of bodily development on the basis of hypophyseal dysfunction. The roentgenogram evidenced also a retardation of maturation of the osseous skeleton. The hand was that of a 5 year old girl. The proximal epiphyses were covered with accessory epiphyses to such a degree as to present a mulberrylike appearance. The capitulum humeri on both sides was irregularly flecked with denser shadows, and on the left side there was present, totally separated from the epiphysis itself, a shell-like flat accessory epiphysis. The entire picture resembled that of the so-called osteochondritis capituli humeri of

FIG. 1 (Liess).

Panner. On the frontal projection of the knee joint (FIG. 1) there were visible on the dorsal aspect of the condylus femoris medialis irregularities of contour and numerous free islands of bone tissue. The ossification center of the patella on this side appeared to be vaguely shadowed and, in places, presented a granulofloccullent appearance. Such findings have been pronounced an aseptic necrosis by Schinz. On the sagittal projection of the foot the navicular bone on the right side was dense and somewhat spotty in appearance. The navicular bone on the left side exhibited a

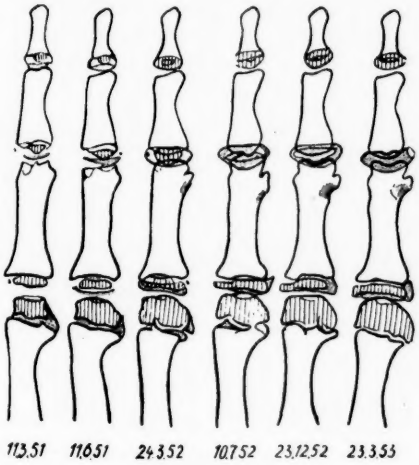

FIG. 2 (Liess).

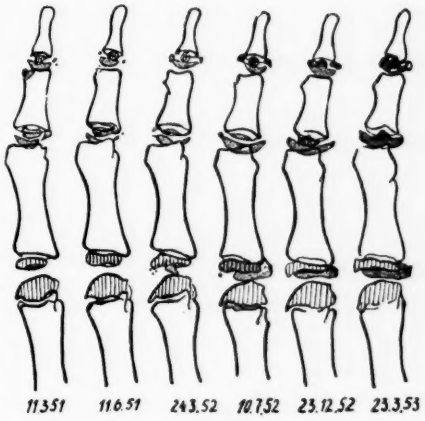

FIG. 3 (Liess).

double ossification center and, on frontal projection, appeared denser and flatter than on the right, thus suggesting a Koehler I disease. The basal epiphyses of the first metatarsals showed evident changes. The right calcaneal apophysis was composed of multiple tiny ossification centers, frequently so fine as to be dustlike. While under observation, however, this patient did not evidence any true aseptic necroses.

The third case was that of a 15 year old boy. The condition is designated by the author as a hereditary, multiple disturbance of epiphyseal ossification. This malady was first described by Silverskiold in 1925 (*Acta radiol.*, 4: 33) and was designated achondroplasia atypica. Other designations are chondro-osteodystrophy (Brailsford, 1928), dystrophie osseuse familiale (Morquio, 1929) and, more recently, dysplasia epiphysialis multiplex by Fairbank (*J. Bone Surg.*, 1947, 31-b: 600). One of the patient's two sisters presented roentgenological findings suggesting that a similar prefusional weakness of epiphyseal development may at one time have existed.

This patient began to suffer from swelling of the middle phalangeal joint of the second finger of the right hand, later, also of the middle phalangeal joint of the third finger of the left hand, and of the basal joint of the third finger on the right. Pains were present only when the boy was engaged in heavy labor. He was of somewhat asthenic habitus but not ill-proportioned; the ear lobes were deformed (grown down); the hands and feet were cold and sweaty. Dermographism was present and the phosphorus titer of the blood serum was too high.

The second finger on the right hand exhibited an ulnar deviation at the middle joint. The middle joint of the second finger and the basal joint of the third finger of the right hand, and the middle joint of the third finger of the left hand were thickened; the middle joint of the second finger of the left hand disclosed a marked limitation of movement with grinding and snapping sensations. Throughout this patient's skeletal framework were numerous other evidences of disturbed epiphyseal development.

This patient was under roentgenologic study for more than 2 years and the rather extensive data procured are presented in tabular form for the second (FIG. 2) and third (FIG. 3) fingers of the right hand. These results merely show that there are present deformities of the normal epiphyses—development of accessory epiphyses with further growth and fusional processes—resulting eventually in an almost normal appearing adult epiphysis in some instances and, in others, involvement of these accessory ossification centers in a process of aseptic necrosis. Finally, the schematic figures mentioned indicate certain peculiar accompanying deformities in the capitula of the metacarpals depicted.

The general conclusion of the author is that the development of accessory centers of ossification is not a pathological manifestation. They seem to indicate an attempt on the part of nature to compensate for some deficiency, or deficiencies, in the developmental capacities of the epiphyses, and will usually be found to help in the formation of the eventual epiphyseal structure; when they do not, that is, when they fall victim to a process of aseptic necrosis, it will usually develop that this process occurs at the points of greatest stress in the joint, and the necrotic process probably represents an inability of the deficient original epiphyseal structure—plus the accessory center of ossification—to carry the normal physiological load.

—*John W. Brennan, M.D.*

MISCELLANEOUS

Use of Hyaluronidase in Soft Tissue Injury and Its Influence on Experimental Bone Repair. JOHN J. GARTLAND and WILLIAM R. MACAUSLAND, JR. *Arch. Surg.*, 1954, 68: 305.

HYALURONIDASE is a specific agent for definitive therapy of hematoma, hemarthrosis, and localized edema, and provides the most effective nonsurgical method for treatment of impending Volkmann's ischemic contracture. It is suggested that hyaluronidase, if used early and in adequate dosage, can prevent the development of myositis ossificans, and it has been used specifically in the treatment of direct trauma to the quadriceps and brachialas muscles and as a prophylactic to prevent myositis ossificans. It is the only effective agent known at present for the definitive treatment of the hemarthroses and hematomas of hemophilia.

Experimental study showed no appreciable constant difference in healing of the bone of the iliac crest of rabbits treated with hyaluronidase and of those not so treated, which led to the conclusion that the enzyme alone in the usual clinical dosage does not deter bone healing.

—*Lois Cowan Collins, M.D.*

MISCELLANEOUS

CLINICAL ENTITIES— GENERAL PHYSIOLOGICAL CONDITIONS

Cushing's Syndrome Associated with Obliterative Arterial Disease and Multiple Subcutaneous Nodules (Ehlers-Danlos Syndrome?). CARL LUDV. LAANE. *Acta med. scand.*, 1954, 148: 323.

EHLERS-DANLOS' syndrome is a disease characterized by multiple subcutaneous nodules, pseudotumors over the bony prominences, and increased elasticity and fragility of the skin and blood vessels. The possibility of some relationship between this disease and certain endocrine diseases has been suggested by some.

A case is reported here of a patient with Cushing's syndrome associated with Ehlers-Danlos' syndrome. A 52 year old woman presented the major characteristics of both syndromes, one of the outstanding findings being the multiple, movable, subcutaneous nodules of all the extremities, particularly on the extensor surfaces. In roentgenograms the nodules showed up well as scattered calcareous opacities close to the skin, each with a relatively translucent zone at the center.

Pathologic study revealed amorphous fatty tissue with some calcification, surrounded by a fibrous capsule. The pathologic diagnosis was encapsulated fat necrosis. Total adrenalectomy produced little improvement in the Cushing's syndrome.

Search for subcutaneous nodules should be made in all patients with either or both of these syndromes.

—Stanley W. Tuell, M.D.

Interdigital Sinuses of Barbers' Hands. A. R. CURRIE, T. GIBSON, and A. L. GOODALL. *Brit. J. Surg.*, 1953, 41: 278.

A VISIT to the clinic by a barber with an interdigital sinus of the hand prompted further investigation of this affliction, and subsequent examination of 77 gentlemen's hairdressers showed 10 of them to have various stages of interdigital web sinus formation. In contrast to this, when 61 ladies' hairdressers were examined, not one of them had any evidence of this lesion.

The sequence of events leading to the development of the lesion is as follows: hair collects in the webs of the barbers' hands and the short, sharp pieces may penetrate the epidermis when compressed between the skin of the web. Secondary infection occurs and, as more hair gathers in this area, the reactive changes progress until multiple abscesses and small sinuses are produced. In some patients, hair may be seen protruding from the sinuses at the time of the examination, and in others the fragments of hair may be found in the depths of the sinuses.

Duration of the symptoms varied widely, from 5 days to 15 years. In 1 instance the patient had not been aware of the shallow, interdigital web pits.

The very early lesions responded well to cleansing and removal of hair from the sinuses and prevention of further entry of hair. The older lesions were treated by excision.

Microscopic examination of the older lesions showed the sinus tract to be lined with a nonpigmented squamous epithelium, without rete pegs, and the tips of the sinus tract showed a granulomatous lesion. Chronic inflammatory reaction in various stages was seen in the surrounding areas.

Considerable discussion is presented on factors determining the entry of hair and the site of the location. It appears that the short clipped hair gathers in the barbers' hands as they run their fingers through the customers' hair and fragments of hair are most likely to be found in greater concentration on the webs. Perspiration and the accumulation of hair cream in these areas further promote adherence of the clipped hair, and the subsequent pressure and friction in the webs drive the sharp, short clipped hair into the skin. This appears to be the reason for its absence in the hands of ladies' hairdressers.

A review of the literature revealed that this occupational disease had been described in 1880; and subsequently 18 cases have been reported. The lesion, however, is now known to be relatively common among barbers. The authors feel that better hand hygiene by the barbers would prevent the development of this irritating disability.

—Yoshio Sako, M.D.

The Association of Familial Polyposis of the Colon with Multiple Sebaceous Cysts. MICHAEL C. OLDFIELD. *Brit. J. Surg.*, 1954, 41: 534.

THE author presents 3 cases, in the same family, of polyposis of the colon and associated sebocystomatosis. A number of roentgenograms are appended which verify the presence of pathologic findings and extensive cutaneous cystic involvement.

In the first case, several sebaceous cysts had been removed. These were noted at the age of 6 years. The patient was 26 years old at the time a total colectomy and excision of the rectum was accomplished. No histologic evidence of cancer was found. The second patient, a male 32 years of age, had 60 cysts on his body. At operation for polyposis the condition appeared to be nonresectable. In the third patient, a female, cysts developed at 10 years of age; 22 cysts had been removed. At the age of 51 years the patient succumbed to widespread metastatic carcinoma of the colon.

From the family pedigree, it would appear that the sebaceous cysts in these cases were inherited as a dominant trait. The father of the three siblings had sebocystomatosis without polyposis; however, he must have transmitted the tendency to colonic polyposis to his progeny—a second gene mutation. The tendency to polyposis in subsequent generations is not evident, and indicates a variable degree of penetrance. Colon polyposis may be transmitted by male or female. The onset of symptoms is usually at about 20 years of age. Cancer may be noted after 15 years of the disease.

A type of polyposis which affects the stomach and small bowel has been described and has been associated with pigmented spots inside the mouth, lips, and other parts. The type of familial polyposis of the colon

in which carcinoma develops has not been associated with melanin-pigmented spots.

The treatment in cases similar to those described should be total extirpation of the colon including the rectum. Abdominal ileostomy is performed. It is hazardous to leave the rectum in situ.

—*Richard L. Lawton, M.D.*

Epithelioma Complicating Lupus Vulgaris Necessitating Forequarter Amputation. M. F. A. Woodruff and R. C. Nairn. *Brit. J. Surg.*, 1954, 41: 489.

The occurrence of epithelioma is an infrequent complication of lupus vulgaris; it arises in perhaps 2 per cent of all cases. Undoubtedly the various agents employed for the treatment of this dermatosis have some bearing on the appearance of this malignant complication. The roentgen ray has been implicated in some instances but there are authenticated cases in which epithelioma occurred without any preceding radiotherapy. Carbon dioxide snow must also be considered to have possible carcinogenic effects.

The authors report an unfortunate case in which the occurrence of an epithelioma on an area of lupus in the chest wall with a fungating mass in the axilla of that side necessitated a forequarter amputation. The patient, a woman of 49, had had lupus from the age of 3 on; involvement of the right breast developed at the age of 21. This lesion had been treated with a great variety of local applications, radiotherapy, and even surgical procedures. Unfortunately the extensive operation was not successful as the patient developed carcinomatous nodules in the skin flaps 3 weeks after surgery.

—*Benjamin F. Lounsbury, M.D.*

DUCTLESS GLANDS

Oral Cortisone Treatment of Hypopituitarism. H. L. Sheehan and V. K. Summers. *Brit. M. J.*, 1954, p. 723.

Four patients with severe hypopituitarism were given small doses of cortisone orally over a period of about 2 years. Three of them were typical examples of severe hypopituitarism due to postpartum necrosis. The fourth patient was a man with hypopituitarism of unknown etiology, probably due to some form of atrophy and scarring of the pituitary gland. In all 4 cases there was marked improvement in the general condition within 3 or 4 days. The patients became mentally alert and took a normal interest in their surroundings. This improvement was maintained satisfactorily on a dosage of 12.5 mgm. daily. The initial period of treatment with 25 mgm. produced in all cases a normal capillary flush of the cheeks, a return of axillary secretion, and the occurrence of sweating on exercise. This improvement, once established, was then maintained by the 12.5 mgm. daily dosage. Two of the female patients had no change in body hair, but the third female patient developed a small amount of pubic hair and some thickening of the head hair after 6 months of treatment. The male patient, in the course of 6 months of treatment, developed a slight amount of pubic hair and a slight return of hair on the legs. The amenorrhea was not affected in any way. The blood pressure remained unchanged in 2 patients. In the third there was a slight rise, and in the fourth patient there was an irregularly increasing hypertension. Two of the patients had a definite increase in weight during the several months of treatment.

It has been noted by the authors that there are some aspects of the syndrome of hypopituitarism that are manifestations of secondary thyroid hypofunction, such as mental slowness and lack of interest, sensitivity to cold, and the absence of sweating, symptoms which are characteristic of myxedema. These aspects are influenced by cortisone but not by thyroid. In some patients with hypopituitarism testosterone produces a sensation of well-being and improves the physical strength and mental activity. Cortisone has similar but greater effects on the physical and mental activity, although it does not always restore the body hair.

It is a common practice to prescribe a combination of many kinds of treatment for hypopituitarism: thyroid, estrogens, deoxycortone, sodium chloride, and various vitamins. The only definite observation which the authors made is that in certain cases the puffiness of the eyes is reduced by a combination of thyroid and cortisone, but not by either given separately. It is their experience that up to the present time it seems that cortisone therapy is the most useful for long term treatment of patients with hypopituitarism.

—*John E. Karabin, M.D.*